pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0002208**
Facility Type	**Industrial**	APS ID	**1001540**
Major / Minor	**Major**	Authorization ID	**1288111**

NPDES PERMIT FACT SHEET INDIVIDUAL INDUSTRIAL WASTE (IW) AND IW STORMWATER

Applicant and Facility Information

Applicant Name	**Shell Chemicals Appalachia LLC**	Facility Name	**Shell Polymers Monaca Site**
Applicant Address	4301 Dutch Ridge Road	Facility Address	300 Frankfort Road
	Beaver, PA 15009		Monaca, PA 15061-2210
Applicant Contact	H. James Sewell	Facility Contact	***same as applicant***
Applicant Phone	(724) 709-2411	Facility Phone	***same as applicant***
Client ID	311950	Site ID	102360
SIC Code	2821, 2869	Municipality	Potter Township
SIC Description	Manufacturing - Industrial Organic Chemicals, NEC, Manufacturing - Plastics Materials And Resins	County	Beaver
Date Application Received	September 12, 2019	EPA Waived?	No
Date Application Accepted	September 13, 2019	If No, Reason	Major Facility
Purpose of Application	Renewal of an NPDES permit for discharges of industrial waste, cooling water, and storm water from a petrochemical manufacturing facility.		

Summary of Review

Shell Chemical Appalachia LLC (Shell) submitted an application dated September 10, 2019 and received by the Department of Environmental Protection (DEP) on September 12, 2019 to renew NPDES Permit No. PA0002208 for discharges of treated process wastewater, cooling tower blowdown, intake screen backwash water, steam condensate, treated and untreated storm water associated with industrial activities, hydrostatic test water, and groundwater from the Shell Polymers Monaca Site (SPMS)—formerly the Shell Chemical Appalachia Petrochemicals Complex. Discharges will be to the Ohio River and two tributaries to the Ohio River: Poorhouse Run and Rag Run. By letter dated January 22, 2020, Shell provided additional details on the design of its modified cooling water intake structure at DEP's request. By email dated June 10, 2020, Shell provided analytical data for Outfall 005.

The SPSM will employ four processing units (an Ethylene Cracker Unit and three Polyethylene Units) and a Steam and Power Generation Unit to convert a feedstock composed of natural gas liquids containing ethane into polyethylene pellets. The SPSM also will operate a cooling water intake structure to withdraw water from the Ohio River; a raw water treatment plant to treat water from the Ohio River for Shell's industrial uses; and a wastewater treatment plant to treat wastewaters prior to discharge. The SPMS is currently under construction and will continue to be under construction for part of forthcoming five-year permit term with various components coming online in advance of full startup.

The NPDES permit will authorize twenty-three outfalls and three internal monitoring points (IMPs). Outfall 001 is the facility's primary discharge location for treated process wastewater and storm water from the wastewater treatment plant (monitored at IMP 101) and cooling tower blowdown (monitored at IMP 201). The process wastewaters are regulated by 40 CFR part 414 – Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category Effluent Limitations Guidelines. Outfalls 002, 003, 004, 005, 006, 007, 008, 009, 010, 012, 013, 014, 016, 017, 018, 019, 020, 021, 022, 023 will discharge storm water associated with industrial activities. In addition to storm water, Outfall 005 also discharges groundwater. Outfall 011 will discharge backwash water from the cooling water intake structure's intake screen. Outfall 015 currently discharges

Approve	Deny	Signatures	Date
X		Ryan C. Decker, P.E. / Environmental Engineer	July 13, 2020
X		Michael E. Fifth, P.E. / Environmental Engineer Manager	July 23, 2020

Summary of Review

groundwater from a small seepage area along the Ohio River. Shell's sanitary wastewaters will be conveyed to the local sanitary sewer for treatment by the Center Township Sanitary Authority.

Clean Water Act Section 316(b) – Cooling Water Intake Structures

Shell will operate a cooling water intake structure on the Ohio River that supplies the SPMS with cooling water and water for manufacturing. Section 316(b) of the Clean Water Act requires the use of Best Technology Available (BTA) for the minimization of adverse environmental impact, which includes the minimization of impingement mortality and entrainment of all life stages of fish and shellfish at cooling water intake structures for power-generating and manufacturing facilities.

On August 15, 2014, EPA promulgated regulations to implement Section 316(b) of Clean Water Act pertaining to existing cooling water intake structures. The regulations established BTA standards to reduce impingement mortality and entrainment of all life stages of fish and shellfish at existing power-generating and manufacturing facilities. The Final Rule took effect on October 14, 2014. Regulations implementing the 2014 Final Rule (and the previously promulgated Phase I Rule) are provided in 40 CFR part 125, Subparts I and J for new facilities and existing facilities, respectively. Associated NPDES permit application requirements for facilities with cooling water intake structures are provided in 40 CFR Part 122, Subpart B – Permit Application and Special NPDES Program Requirements (§ 122.21(r)).

Shell's cooling water intake structure is subject to the specific requirements of 40 CFR Part 125, Subpart J, §§ 125.94 through 125.99. Shell will comply with BTA standards for impingement and entrainment by using a closed-cycle recirculating system.

Nurdles

In 2019, DEP received inquiries from the press about how Shell will manage nurdles—the plastic pellets Shell will produce. Discharges of nurdles are regulated by the permit's prohibition on the discharge of "floating materials, scum, sheen, or substances that result in deposits in the receiving water" imposed in the permit pursuant to 25 Pa. Code § 92a.41(c). The general water quality criteria regulations in 25 Pa. Code § 93.6 also state that "Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life" with the specific substances to be controlled including, among other things, "floating materials, oil, grease, scum and substances that produce color, tastes, odors, turbidity or settle to form deposits."

Separate from the water regulations, the Solid Waste Management Act also regulates nurdle releases. The Act defines pollution as "contamination of any air, water, land or other natural resources of the Commonwealth such as will create or is likely to create a public nuisance or to render such air, water, land or other natural resources harmful, detrimental or injurious to public health, safety or welfare, or to domestic, municipal, commercial, industrial, agricultural, recreational or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other life." The Act also states, "it shall be unlawful for any person or municipality to dump or deposit any solid waste onto the ground or into the waters of the Commonwealth, by any means, unless a permit has been obtained from the department."

In addition to the NPDES permit's existing prohibitions, the following Best Management Practice taken from Appendix S of DEP's PAG-03 General Permit for Discharges of Stormwater Associated with Industrial Activities will be imposed in the permit:

> Minimize the discharge of plastic resin pellets in your stormwater discharges through implementation of control measures including but not limited to the following: minimize spills; clean up spills promptly and thoroughly; sweep thoroughly; pellet capturing; employee education; and disposal precautions.

For its part, Shell will have screens on its catch basins to catch nurdles before they get into the site's storm sewers and will have staff onsite to conduct regular inspections to pick up any nurdles caught by the screens and respond appropriately to any other spills. Nurdles that may make it past the screens should be detained in the site's concrete tank for "Accidentally Contaminated" runoff or in one of the site's other storm water ponds if nurdles are outside the process area that drains to that tank. The Pollution Prevention Contingency Plan ("PPC Plan") required by the permit should provide information pertaining to Shell's spill control and response measures.

Summary of Review

Public Participation

DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested persons for a 30-day period (which may be extended for one additional 15-day period at DEP's discretion), which will be considered in making a final decision on the application. Any person may request or petition for a public hearing with respect to the application. A public hearing may be held if DEP determines that there is significant public interest in holding a hearing. If a hearing is held, notice of the hearing will be published in the *Pennsylvania Bulletin* at least 30 days prior to the hearing and in at least one newspaper of general circulation within the geographical area of the discharge.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	3.75
Latitude	40° 40' 22.996"	Longitude	-80° 20' 18.489"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Treated process water and storm water from the wastewater treatment plant (monitored at IMP 101) and cooling tower blowdown (monitored at IMP 201)		
Receiving Waters	Ohio River (WWF)	Stream Code	32317
NHD Com ID	99679552	RMI	952.70
Drainage Area	22,771.80 mi^2	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)	682 (normal pool)	Slope (ft/ft)	
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Sources unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: None; facility under construction

Discharge, Receiving Waters and Water Supply Information			
IMP No.	101	Design Flow (MGD)	1.28
Latitude	N/A	Longitude	N/A
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Treated process water and storm water from the wastewater treatment plant		
Receiving Waters	Ohio River through Outfall 001	Stream Code	32317

Changes Since Last Permit Issuance: None; facility under construction

Discharge, Receiving Waters and Water Supply Information			
IMP No.	201	Design Flow (MGD)	2.47
Latitude	N/A	Longitude	N/A
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Cooling tower blowdown		
Receiving Waters	Ohio River through Outfall 001	Stream Code	32317

Changes Since Last Permit Issuance: None; facility under construction

Discharge, Receiving Waters and Water Supply Information

Outfall No.	002	Design Flow (MGD)	Variable
Latitude	40° 40' 36.32"	Longitude	-80° 19' 43.83"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the East RR Pond		
Receiving Waters	Rag Run (WWF)	Stream Code	33949
NHD Com ID	99679382	RMI	0.05
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Siltation		
Source(s) of Impairment	Removal of riparian vegetation, Road Runoff		
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	1.04

Changes Since Last Permit Issuance: None; facility under construction

Discharge, Receiving Waters and Water Supply Information

Outfall No.	003	Design Flow (MGD)	Variable
Latitude	40° 40' 36.32"	Longitude	-80° 19' 43.51"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the East RR Pond		
Receiving Waters	Rag Run (WWF)	Stream Code	33949
NHD Com ID	99679382	RMI	0.05
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Siltation		
Source(s) of Impairment	Removal of riparian vegetation, Road Runoff		
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	004	Design Flow (MGD)	Variable
Latitude	40° 39' 57.4943"	Longitude	-80° 20' 40.5531"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the Accidentally Contaminated (AC) Pond		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99700118	RMI	0.25
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.35

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	005	Design Flow (MGD)	0.0428
Latitude	40° 40' 50.29"	Longitude	-80° 19' 11.14"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Groundwater discharges from Mall Lot 2		
Receiving Waters	Ohio River (WWF)	Stream Code	32317
NHD Com ID	134396158	RMI	953.78
Drainage Area	22,763.34 mi^2	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Sources Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	2.07

Changes Since Last Permit Issuance: Additional monitoring requirements

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	006	Design Flow (MGD)	Variable
Latitude	40° 39' 57.17"	Longitude	-80° 20' 9.11"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the South Ponds		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99680192	RMI	0.74
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.84

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	007	Design Flow (MGD)	Variable
Latitude	40° 39’ 57.0622”	Longitude	-80° 20’ 9.1604”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the South Ponds		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99680192	RMI	0.74
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.84

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	008	Design Flow (MGD)	Variable
Latitude	40° 39’ 56.27”	Longitude	-80° 20’ 32.18”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the Clean Rainwater (CR) Pond; steam condensate		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99680192	RMI	0.36
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.46

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information			
IMP No.	108	Design Flow (MGD)	Variable
Latitude	N/A	Longitude	N/A
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Hydrostatic test water		
Receiving Waters	Poorhouse Run through Outfall 008 or the Ohio River through Outfall 013	Stream Code	33932

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	009	Design Flow (MGD)	Variable
Latitude	40° 39’ 56.2702”	Longitude	-80° 20’ 32.187”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the Clean Rainwater (CR) Pond; steam condensate		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99680192	RMI	0.37
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.47

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	010	Design Flow (MGD)	Variable
Latitude	40° 39’ 54.71”	Longitude	-80° 20’ 22.16”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the West RR Basin		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99680192	RMI	0.50
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.60

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	011	Design Flow (MGD)	0.69
Latitude	40° 40’ 4.00”	Longitude	-80° 20’ 48.00”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Intake screen backwash water		
Receiving Waters	Ohio River (WWF)	Stream Code	32317
NHD Com ID	99679932	RMI	952.10
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.39

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	012	Design Flow (MGD)	Variable
Latitude	40° 39’ 54.3288”	Longitude	-80° 20’ 21.869”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the West RR Basin		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99680192	RMI	0.50
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.60

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	013	Design Flow (MGD)	Variable
Latitude	40° 40’ 33”	Longitude	-80° 20’ 3”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the North Pond; steam condensate		
Receiving Waters	Ohio River (WWF)	Stream Code	32317
NHD Com ID	99679932	RMI	952.90
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	1.19

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	014	Design Flow (MGD)	Variable
Latitude	40° 40’ 29.23”	Longitude	-80° 19’ 58.05”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the North Pond		
Receiving Waters	Ohio River (WWF)	Stream Code	32317
NHD Com ID	99679932	RMI	952.90
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	1.19

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	015	Design Flow (MGD)	Variable
Latitude	40° 40' 47.53"	Longitude	-80° 19' 19.32"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Groundwater seep		
Receiving Waters	Ohio River (WWF)	Stream Code	32317
NHD Com ID	99679932	RMI	953.70
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	1.99

Changes Since Last Permit Issuance: None

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	016	Design Flow (MGD)	Variable
Latitude	40° 40' 37.223"	Longitude	-80° 19' 50.142"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the plant and Duquesne Light and PennDOT rights-of-way		
Receiving Waters	Ohio River (WWF)	Stream Code	32317
NHD Com ID	99679932	RMI	953.11
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	1.4

Changes Since Last Permit Issuance: New outfall

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	017	Design Flow (MGD)	Variable
Latitude	40° 39' 56.295"	Longitude	-80° 20' 48.680"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water runoff from wastewater treatment plant areas		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99679956	RMI	0.13
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.23

Changes Since Last Permit Issuance: New outfall

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	018	Design Flow (MGD)	Variable
Latitude	40° 39' 22.355"	Longitude	-80° 20' 56.304"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water runoff from Parking Area Pond A West		
Receiving Waters	Raccoon Creek (WWF)	Stream Code	33564
NHD Com ID	99680646	RMI	0.45
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status	Final	Name	Raccoon Creek Watershed
Nearest Downstream Public Water Supply Intake	Midland Borough Municipal Authority		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	945.38	Distance from Outfall (mi)	6.49

Changes Since Last Permit Issuance: New outfall

Other Comments:

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	019	Design Flow (MGD)	Variable
Latitude	40° 39' 26.757"	Longitude	-80° 20' 50.466"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows from the Parking Area Pond A West		
Receiving Waters	Raccoon Creek (WWF)	Stream Code	33564
NHD Com ID	99680646	RMI	0.45
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status	Final	Name	Raccoon Creek Watershed
Nearest Downstream Public Water Supply Intake	Midland Borough Municipal Authority		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	945.38	Distance from Outfall (mi)	6.49

Changes Since Last Permit Issuance: New outfall

Other Comments:

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	020	Design Flow (MGD)	Variable
Latitude	40° 39' 32.633"	Longitude	-80° 20' 41.880"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the Parking Area Pond B East		
Receiving Waters	Raccoon Creek (WWF)	Stream Code	33564
NHD Com ID	99680646	RMI	0.45
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status	Final	Name	Raccoon Creek Watershed
Nearest Downstream Public Water Supply Intake	Midland Borough Municipal Authority		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	945.38	Distance from Outfall (mi)	6.49

Changes Since Last Permit Issuance: New outfall

Other Comments:

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	021	Design Flow (MGD)	Variable
Latitude	40° 39' 40.28"	Longitude	-80° 20' 33.68"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water runoff from Electric Tower Road		
Receiving Waters	Poorhouse Run (WWF)	Stream Code	33932
NHD Com ID	99680192	RMI	0.50
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.60

Changes Since Last Permit Issuance: Revised effluent source

Other Comments:

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	022	Design Flow (MGD)	Variable
Latitude	40° 39' 32.274"	Longitude	-80° 20' 43.058"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows from Parking Area Pond B East		
Receiving Waters	Raccoon Creek (WWF)	Stream Code	33564
NHD Com ID	99680646	RMI	0.45
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status	Final	Name	Raccoon Creek Watershed
Nearest Downstream Public Water Supply Intake	Midland Borough Municipal Authority		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	945.38	Distance from Outfall (mi)	6.49

Changes Since Last Permit Issuance: New outfall

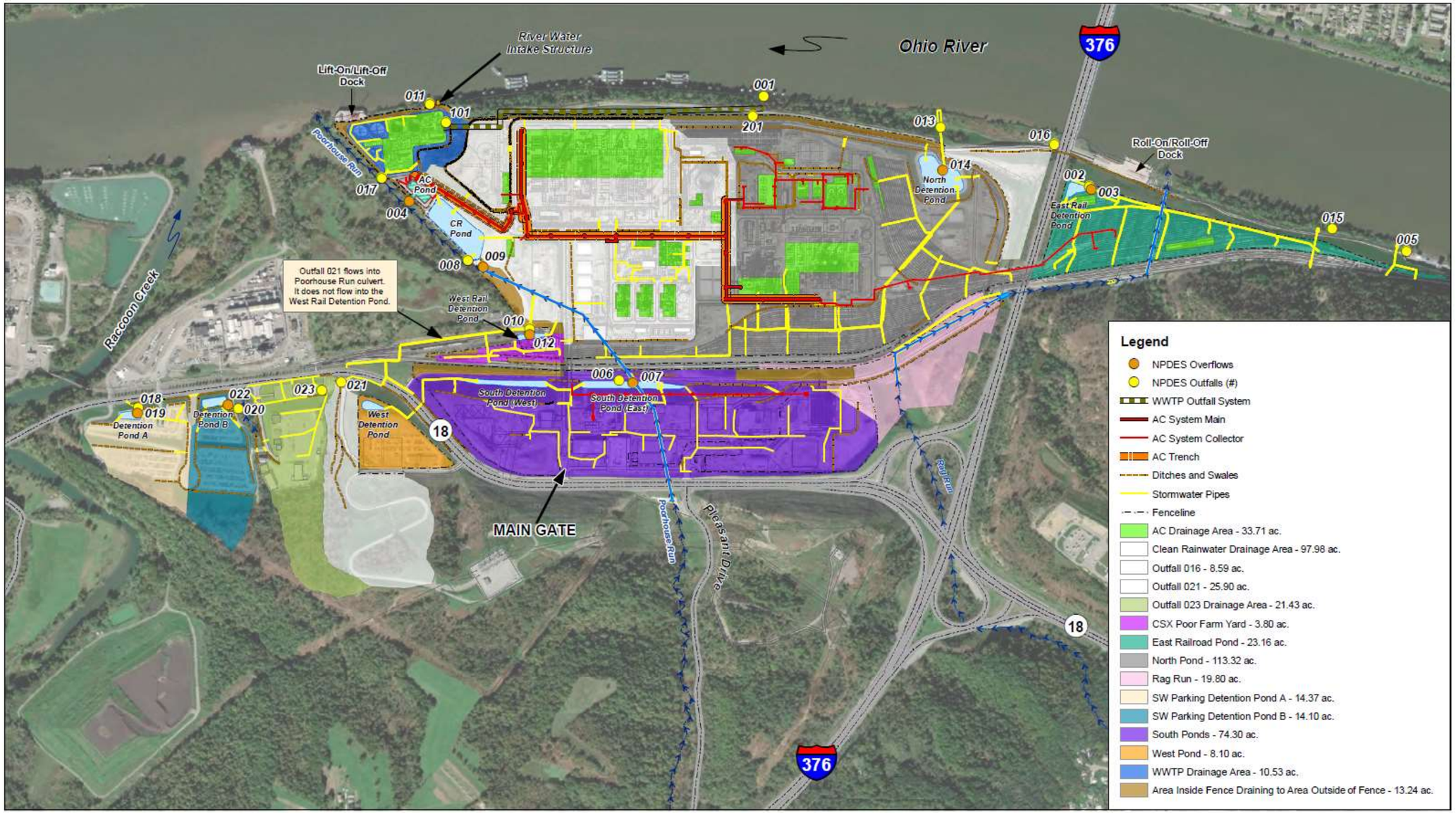
Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	023	Design Flow (MGD)	Variable
Latitude	40° 39' 38.651"	Longitude	-80° 20' 35.918"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water runoff from the Training Center		
Receiving Waters	Raccoon Creek (WWF)	Stream Code	33564
NHD Com ID	99680646	RMI	0.45
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status	Final	Name	Raccoon Creek Watershed
Nearest Downstream Public Water Supply Intake	Midland Borough Municipal Authority		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	945.38	Distance from Outfall (mi)	6.49

Changes Since Last Permit Issuance: New outfall

Other Comments:



Environmental Resources Management, Inc.

September 2019

Scale in Feet
1 inch = 800 feet

800 400 0 800 Feet

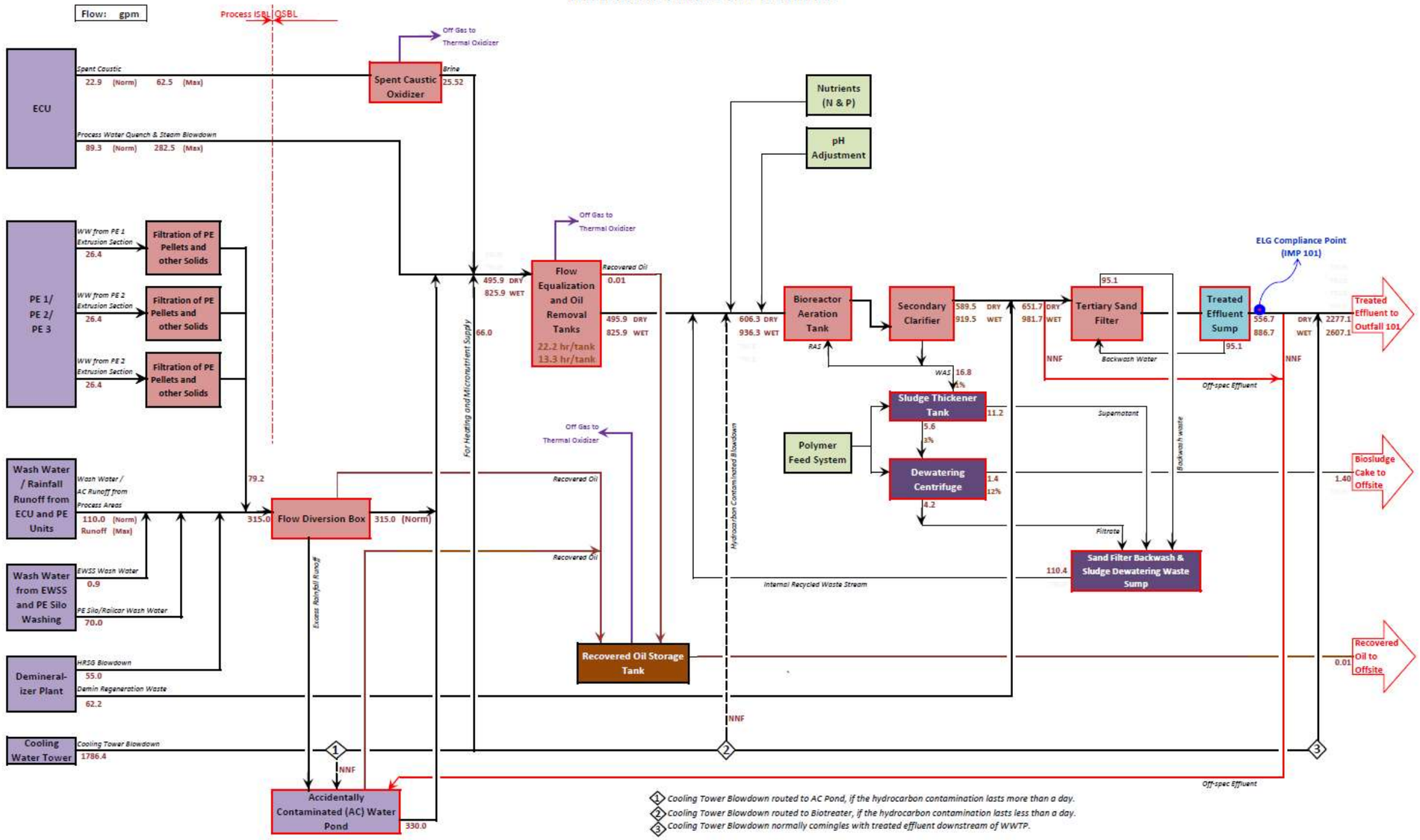
Date: September 9, 2019
Version: 1.0
Prepared by: Brian Sterner (ERM)
Checked by:
Approved by:

Site Drainage

Shell Polymers Monaca, PA

PROJECT FRANKLIN

Wastewater Balance and Treatment



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11/16/2015

WWTP - 1 of 1

Treatment Facility Summary

Treatment Facility Name: Wastewater Treatment Plant

WQM Permit No.	Issuance Date	Purpose
0417201	05/15/2018	Permit issued to Shell Chemical Appalachia LLC for the industrial wastewater treatment system: one diversion box with underflow and overflow baffles, pipe oil skimmer, oil pump, and wastewater transfer pumps; two flow equalization and oil removal tanks; one recovered oil tank; chemical feed systems; two extended aeration activated sludge bioreactors; a centrifuge for sludge dewatering; tertiary dual-media gravity filters; effluent sumps and pumps
0417201 A-1	01/25/2019	Permit issued to Shell Chemical Appalachia LLC for in-ground concrete tank ("AC Pond") to collect excess wastewaters from the diversion box that routes wastewaters to the wastewater treatment plant and, if necessary, off-spec effluent and cooling tower blowdown

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Industrial	Primary, secondary, and tertiary	Flow equalization, oil skimming, extended aeration activated sludge, clarification, gravity filtration, sludge dewatering	No Disinfection	1.35

Changes Since Last Permit Issuance: The Water Quality Management permit and permit amendment are new; the treatment plant is currently under construction.

Compliance History

DMR Data for Outfall 002 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Daily Maximum					0.29						0.63	
pH (S.U.) Daily Maximum					8.15						7.75	
COD (mg/L) Daily Maximum					< 10						< 10	
TSS (mg/L) Daily Maximum					14						91	
Nitrate-Nitrite (mg/L) Daily Maximum					0.58						1.0	
Total Phosphorus (mg/L) Daily Maximum					< 0.1						< 0.1	
Total Aluminum (mg/L) Daily Maximum					0.66						0.083	
Total Iron (mg/L) Daily Maximum					0.7						0.24	
Total Lead (mg/L) Daily Maximum					0.0048						< 0.01	
Total Mercury (mg/L) Daily Maximum					< 0.0002						0.00011	
Total Selenium (mg/L) Daily Maximum					0.0067						0.0044	
Total Thallium (mg/L) Daily Maximum					< 0.02						< 0.02	
Total Zinc (mg/L) Daily Maximum					0.12						0.077	

DMR Data for Outfall 003 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Daily Maximum												0.025
pH (S.U.) Daily Maximum												8.12
COD (mg/L) Daily Maximum												15

TSS (mg/L) Daily Maximum												120
Nitrate-Nitrite (mg/L) Daily Maximum												0.8
Total Phosphorus (mg/L) Daily Maximum												0.17
Total Aluminum (mg/L) Daily Maximum												2.2
Total Iron (mg/L) Daily Maximum												3.5
Total Lead (mg/L) Daily Maximum												0.016
Total Mercury (mg/L) Daily Maximum												0.00048
Total Selenium (mg/L) Daily Maximum												0.0073
Total Thallium (mg/L) Daily Maximum												< 0.02
Total Zinc (mg/L) Daily Maximum												0.22

DMR Data for Outfall 005 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Average Monthly	0.0428	0.03196	0.05292	0.02952	0.0332	0.036	0.04363	0.02493	0.0304	0.0541	0.0597	0.0481
Flow (MGD) Daily Maximum	0.0504	0.03312	0.0756	0.03168	0.0432	0.0432	0.0467	0.0315	0.0398	0.067	0.0626	0.0568
pH (S.U.) Minimum	7.11	7.1	7.53	6.78	7.05	7.2	6.77	6.95	6.89	7.28	7.11	7.11
pH (S.U.) Maximum	7.13	7.79	7.68	6.97	8.2	7.31	7.39	7.13	7.5	7.64	7.5	7.21
TSS (mg/L) Average Monthly	10.6	< 0.5	< 0.5	0.7	< 1.5	< 0.5	3.8	1.8	5.8	1	< 1.2	1.3
TSS (mg/L) Instantaneous Maximum	19	0.5	< 0.5	0.8	2.4	0.5	5	2.3	6.1	1.2	1.9	1.5
Total Cadmium (mg/L) Average Monthly		0.0133			0.01016 6667			0.01066			0.00966 6667	
Total Cadmium (mg/L) Instantaneous Maximum		0.015			0.012			0.011			0.01	

Hexavalent Chromium (mg/L) Average Monthly		< 0.01			< 0.00896 6667			< 0.01			< 0.00893 3333	
Hexavalent Chromium (mg/L) Instantaneous Maximum		< 0.01			< 0.01			< 0.01			< 0.01	
Total Lead (mg/L) Average Monthly		< 0.00883 333			< 0.0083			< 0.009			< 0.00883 3333	
Total Lead (mg/L) Instantaneous Maximum		< 0.01			< 0.01			< 0.01			< 0.01	
Total Selenium (mg/L) Average Monthly		< 0.0067			< 0.00632			< 0.0085			0.0058	
Total Selenium (mg/L) Instantaneous Maximum		< 0.01			< 0.01			< 0.01			0.0072	

DMR Data for Outfall 006 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Daily Maximum					1.45						0.27	
pH (S.U.) Daily Maximum					8.08						7.62	
COD (mg/L) Daily Maximum					< 10.0						< 10.0	
TSS (mg/L) Daily Maximum					4.3						3.6	
Nitrate-Nitrite (mg/L) Daily Maximum					0.47						0.99	
Total Phosphorus (mg/L) Daily Maximum					< 0.1						< 0.1	
Total Aluminum (mg/L) Daily Maximum					0.094						0.16	
Total Iron (mg/L) Daily Maximum					0.16						0.14	
Total Lead (mg/L) Daily Maximum					< 0.01						< 0.01	
Total Mercury (mg/L) Daily Maximum					< 0.0002						< 0.0002	

Total Selenium (mg/L) Daily Maximum					0.0084						0.0041	
Total Thallium (mg/L) Daily Maximum					< 0.02						< 0.02	
Total Zinc (mg/L) Daily Maximum					0.053						0.061	

DMR Data for Outfall 008 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Daily Maximum					2.55						1.9	
pH (S.U.) Daily Maximum					8.19						8.0	
COD (mg/L) Daily Maximum					< 10.0						32	
TSS (mg/L) Daily Maximum					82.0						42	
Nitrate-Nitrite (mg/L) Daily Maximum					0.95						3.1	
Total Phosphorus (mg/L) Daily Maximum					0.1						< 0.1	
Total Aluminum (mg/L) Daily Maximum					0.49						1.1	
Total Iron (mg/L) Daily Maximum					1.5						1.2	
Total Lead (mg/L) Daily Maximum					0.0068						< 0.01	
Total Mercury (mg/L) Daily Maximum					< 0.0002						< 0.0002	
Total Selenium (mg/L) Daily Maximum					0.014						0.009	
Total Thallium (mg/L) Daily Maximum					< 0.02						< 0.02	
Total Zinc (mg/L) Daily Maximum					0.13						0.075	

DMR Data for Outfall 009 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19

Flow (MGD) Daily Maximum											0.089	
pH (S.U.) Daily Maximum											8.16	
COD (mg/L) Daily Maximum											< 10	
TSS (mg/L) Daily Maximum											39	
Nitrate-Nitrite (mg/L) Daily Maximum											0.79	
Total Phosphorus (mg/L) Daily Maximum											0.099	
Total Aluminum (mg/L) Daily Maximum											0.75	
Total Iron (mg/L) Daily Maximum											1.1	
Total Lead (mg/L) Daily Maximum											0.0041	
Total Mercury (mg/L) Daily Maximum											< 0.0002	
Total Selenium (mg/L) Daily Maximum											0.0043	
Total Thallium (mg/L) Daily Maximum											< 0.02	
Total Zinc (mg/L) Daily Maximum											0.068	

DMR Data for Outfall 013 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Daily Maximum					2.016						1.7	
pH (S.U.) Daily Maximum					8.0						7.65	
COD (mg/L) Daily Maximum					9.9						12	
TSS (mg/L) Daily Maximum					290						240	
Nitrate-Nitrite (mg/L) Daily Maximum					0.77						1.5	

Total Phosphorus (mg/L) Daily Maximum					0.29						0.25	
Total Aluminum (mg/L) Daily Maximum					3.3						1.9	
Total Iron (mg/L) Daily Maximum					7.9						5.3	
Total Lead (mg/L) Daily Maximum					0.02						0.012	
Total Mercury (mg/L) Daily Maximum					0.00083						0.00054	
Total Selenium (mg/L) Daily Maximum					0.0076						0.0096	
Total Thallium (mg/L) Daily Maximum					< 0.02						< 0.02	
Total Zinc (mg/L) Daily Maximum					0.29						0.18	

DMR Data for Outfall 015 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Average Monthly		0.00006			0.00001			0.00002			0.00004	
Flow (MGD) Daily Maximum		0.0001			0.00001			0.00003			0.0004	
pH (S.U.) Minimum		7.39			8.15			8.07			7.17	
pH (S.U.) Maximum		8.44			8.82			8.90			8.7	
TSS (mg/L) Average Monthly		1.6			1.3			< 1.25			< 35.5	
TSS (mg/L) Daily Maximum		2.1			1.6			2.0			180.0	
Oil and Grease (mg/L) Average Monthly		< 5.0			< 3.4			< 4.65			< 5.0	
Oil and Grease (mg/L) Daily Maximum		< 5.0			< 5.2			< 5.0			< 4.0	
Total Antimony (mg/L) Daily Maximum		< 0.01			< 5.2			0.0055			< 0.01	
Total Arsenic (mg/L) Daily Maximum		0.057			0.026			0.04			0.047	
Total Boron (mg/L) Daily Maximum		3.6			3.9			4.3			6.8	

Total Cadmium (mg/L) Daily Maximum		0.11			0.0021			0.0082			0.017	
Total Iron (mg/L) Daily Maximum		0.78			0.59			0.8100			4.8	
Total Lead (mg/L) Daily Maximum		0.0044			< 0.005			< 0.01			0.036	
Total Manganese (mg/L) Daily Maximum		3.8			0.52			0.49			1.5	
Total Mercury (mg/L) Daily Maximum		< 0.0002			< 0.0002			< 0.0002			0.00066	
Total Nickel (mg/L) Daily Maximum		0.084			0.007			0.032			0.0610	
Total Selenium (mg/L) Daily Maximum		< 0.01			< 0.005			< 0.01			0.018	
Total Zinc (mg/L) Daily Maximum		2.7			0.34			1.80			2.8	

DMR Data for Outfall 021 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Daily Maximum		0.005			0.005			0.0596			0.00144	
TSS (mg/L) Daily Maximum		11			33			93			3.6	
Total Aluminum (mg/L) Daily Maximum		0.29			0.44			0.2			0.053	
Total Iron (mg/L) Daily Maximum		0.4			0.86			0.44			0.13	
Total Zinc (mg/L) Daily Maximum		0.06			0.068			0.12			0.073	

DMR Data for Internal Monitoring Point 108 (from May 1, 2019 to April 30, 2020)

Parameter	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19
Flow (MGD) Average Monthly				1.7586								
Flow (MGD) Daily Maximum				1.9008								
pH (S.U.) Minimum				7.27								

pH (S.U.) Maximum				7.65								
TRC (mg/L) Instantaneous Maximum				< 0.03								
TSS (mg/L) Average Monthly				6.6								
TSS (mg/L) Instantaneous Maximum				10.0								
Oil and Grease (mg/L) Average Monthly				< 5.4								
Oil and Grease (mg/L) Instantaneous Maximum				< 6.2								
Dissolved Iron (mg/L) Instantaneous Maximum				0.13								
Benzene (mg/L) Instantaneous Maximum				< 0.0006								
Total BTEX (mg/L) Instantaneous Maximum				< 0.002								

Compliance History

Effluent Violations for Outfall 015, from: September 1, 2018 To: April 30, 2020

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
TSS	06/30/19	Avg Mo	< 35.5	mg/L	30.0	mg/L
TSS	06/30/19	Daily Max	180.0	mg/L	100.0	mg/L

Development of Effluent Limitations

IMP No.	101	**Design Flow (MGD)**	1.28
Latitude	N/A	**Longitude**	N/A

Wastewater Description: Treated process water and storm water from the wastewater treatment plant

The Shell Polymers Monaca Site ("SPMS") is still under construction. Estimated effluent characteristics for full operations have not changed. What follows is a partial reproduction of the effluent limit development sections for IMP 101 included in the 2016 permit amendment's fact sheet. IMP 101's effluent limits are unchanged from the 2016 permit amendment.

Effluent limits are imposed at IMP 101 rather than another monitoring location because 40 CFR § 125.3(f) prohibits compliance with technology-based treatment requirements through the use of "non-treatment" techniques such as flow augmentation (i.e., dilution). Since the wastewaters monitored at IMP 101 combine with other wastewaters before the next downstream monitoring location (Outfall 001), IMP 101 is the only point at which compliance with applicable Federal Effluent Limitations Guidelines may be determined without the interference of other wastewaters. This rationale is consistent with 40 CFR § 122.45(h)[1], which allows for the imposition of effluent limitations on internal waste streams in these circumstances. This rationale also applies to IMPs 201 and 108, which are discussed later in this Fact Sheet.

101.A. Technology-Based Effluent Limitations (TBELs)

Federal Effluent Limitations Guidelines and New Source Determination

Process wastewaters from the SPMS are subject to Federal Effluent Limitations Guidelines (ELGs) under 40 CFR Part 414 – Organic Chemicals, Plastics and Synthetic Fibers (OCPSF) Point Source Category. Shell will produce two types of products: polyethylene and ethylene. Pursuant to the applicability description in 40 CFR § 414.40, polyethylene is a Thermoplastic Resin under Subpart D of the OCPSF ELGs. Pursuant to the applicability description in 40 CFR § 414.60, ethylene is a Commodity Organic Chemical under Subpart F of the OCPSF ELG.

Based on definitions given in 40 CFR §§ 122.2 and 122.29, the SPMS will be a "new source." Classification of the facility as a "new source" is based on 40 CFR § 122.29(b), which states the following:

> (b) Criteria for new source determination.
>
> (1) Except as otherwise provided in an applicable new source performance standard, a source is a "new source" if it meets the definition of "new source" in §122.2, and
>
> (i) It is constructed at a site at which no other source is located; or
>
> (ii) It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
>
> (iii) Its processes are substantially independent of an existing source at the same site. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source.
>
> (2) A source meeting the requirements of paragraphs (b)(1) (i), (ii), or (iii) of this section is a new source only if a new source performance standard is independently applicable to it. If there is no such independently applicable standard, the source is a new discharger. See §122.2."

As § 122.29(b)(1) states, a source is a new source if it meets the definition of "new source" in § 122.2 and is described by any of the subsections of § 122.29(b)(1) reproduced above. Section 122.2 defines "new source" as:

> *New source* means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants," the construction of which commenced:
>
> (a) After promulgation of standards of performance under section 306 of CWA which are applicable to such source, or

[1] 40 CFR § 122.45(h)(1): "When permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible, effluent limitations or standards for discharges of pollutants may be imposed on internal waste streams before mixing with other waste streams or cooling water streams."

(b) After proposal of standards of performance in accordance with section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal.

Construction of the SPMS commenced in 2015/2016 after promulgation of standards of performance applicable to discharges from the facility—those being the New Source Performance Standards (NSPS) under 40 CFR Part 414, which were promulgated in 1987 and updated in 1993. Additionally, pursuant to § 122.2(b)(1), the facility will be constructed at a site where no other source is located. The former Horsehead Monaca Smelter Plant previously located at the site was completely demolished. For these reasons, the SPMS is considered to be a new source.

Table 1 lists the specific sections of the ELGs that apply to the SPMS's process wastewater streams, which will be generated from four process units including one Ethylene Cracker Unit (ECU) and three Polyethylene Units (PEU).

Table 1. Production Information and Applicable Federal Effluent Limitations Guidelines

Product	Production Rate (million tons/year)	Percentage of Total Production	Applicable Effluent Limitations Guidelines
Ethylene Cracker Unit – SIC Code 2869 Industrial Organic Chemicals, Not Elsewhere Classified			
Ethylene	1.65	48.34%	Subpart F – Commodity Organic Chemicals 40 CFR § 414.64 (and § 414.91 by reference)
Polyethylene Units 1 and 2 – SIC Code 2821 Plastics Materials, Synthetic Resins and Nonvulcanizable Elastomers			
Polyethylene	0.606 (each)	17.76% (each)	Subpart D – Thermoplastic Resins 40 CFR § 414.44 (and § 414.91 by reference)
Polyethylene Unit 3 – SIC Code 2821 Plastics Materials, Synthetic Resins and Nonvulcanizable Elastomers			
Polyethylene	0.551	16.14%	Subpart D – Thermoplastic Resins 40 CFR § 414.44 (and § 414.91 by reference)
Total Production	3.413		

TBELs for Toxic Pollutants

New source performance standards under §§ 414.44(a) and 414.64(a) both refer to Subpart I (§ 414.91) for toxic pollutant effluent limits applicable to "Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment." Shell will use biological treatment to treat its process wastewaters and will discharge the effluent to the Ohio River (after combining the treated process wastewater with cooling tower blowdown), so the direct discharge limits apply. Technology-based mass limits for toxic pollutants are calculated by multiplying the expected process wastewater flow rate (1.28 MGD) by the concentrations listed in § 414.91. Table 2 summarizes the applicable concentrations and the calculated mass TBELs.

Table 2. Technology-Based Limits for Toxic Pollutants

Parameter	Mass (lbs/day)		Concentration (mg/L)	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Acenaphthene	0.235	0.630	0.022	0.059
Acenaphthylene	0.235	0.630	0.022	0.059
Acrylonitrile	1.03	2.59	0.096	0.242
Anthracene	0.235	0.630	0.022	0.059
Benzene	0.395	1.45	0.037	0.136
Benzo(a)anthracene	0.235	0.630	0.022	0.059
3,4-Benzofluoranthene	0.245	0.651	0.023	0.061
Benzo(k)fluoranthene	0.235	0.630	0.022	0.059
Benzo(a)pyrene	0.245	0.651	0.023	0.061
Bis(2-ethylhexyl) phthalate	1.10	2.98	0.103	0.279
Carbon Tetrachloride	0.192	0.405	0.018	0.038
Chlorobenzene	0.160	0.299	0.015	0.028

Table 2 (continued). Technology-Based Limits for Toxic Pollutants

Parameter	Mass (lbs/day)		Concentration (mg/L)	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Chloroethane	1.11	2.86	0.104	0.268
Chloroform	0.224	0.491	0.021	0.046
2-Chlorophenol	0.331	1.046	0.031	0.098
Chrysene	0.235	0.630	0.022	0.059
Di-n-butyl phthalate	0.288	0.608	0.027	0.057
1,2-Dichlorobenzene	0.822	1.74	0.077	0.163
1,3-Dichlorobenzene	0.331	0.470	0.031	0.044
1,4-Dichlorobenzene	0.160	0.299	0.015	0.028
1,1-Dichloroethane	0.235	0.630	0.022	0.059
1,2-Dichloroethane	0.726	2.25	0.068	0.211
1,1-Dichloroethylene	0.170	0.267	0.016	0.025
1,2-trans-Dichloroethylene	0.224	0.576	0.021	0.054
2,4-Dichlorophenol	0.416	1.196	0.039	0.112
1,2-Dichloropropane	1.63	2.46	0.153	0.230
1,3-Dichloropropylene	0.309	0.470	0.029	0.044
Diethyl phthalate	0.865	2.17	0.081	0.203
2,4-Dimethylphenol	0.192	0.384	0.018	0.036
Dimethyl phthalate	0.202	0.502	0.019	0.047
4,6-Dinitro-o-cresol	0.833	2.96	0.078	0.277
2,4-Dinitrophenol	0.758	1.31	0.071	0.123
2,4-Dinitrotoluene	1.21	3.04	0.113	0.285
2,6-Dinitrotoluene	2.72	6.85	0.255	0.641
Ethylbenzene	0.341	1.15	0.032	0.108
Fluoranthene	0.267	0.726	0.025	0.068
Fluorene	0.235	0.630	0.022	0.059
Hexachlorobenzene	0.160	0.299	0.015	0.028
Hexachlorobutadiene	0.213	0.523	0.020	0.049
Hexachloroethane	0.224	0.576	0.021	0.054
Methyl Chloride	0.918	2.03	0.086	0.190
Methylene Chloride	0.427	0.950	0.040	0.089
Naphthalene	0.235	0.630	0.022	0.059
Nitrobenzene	0.288	0.726	0.027	0.068
2-Nitrophenol	0.437	0.737	0.041	0.069
4-Nitrophenol	0.769	1.32	0.072	0.124
Phenanthrene	0.235	0.630	0.022	0.059
Phenol	0.160	0.277	0.015	0.026
Pyrene	0.267	0.715	0.025	0.067
Tetrachloroethylene	0.235	0.598	0.022	0.056
Toluene	0.277	0.854	0.026	0.080
1,2,4-Trichlorobenzene	11.9	29.6	0.068	0.140
1,1,1-Trichloroethane	15.5	36.1	0.021	0.054
1,1,2-Trichloroethane	4.49	12.8	0.021	0.054
Trichloroethylene	3.42	7.37	0.021	0.054
Vinyl Chloride	18.1	42.5	0.104	0.268

Section 414.91 also provides limits for chromium, copper, lead, nickel, zinc and total cyanide, but DEP is not imposing limits for those pollutants pursuant to § 414.91(b), which states:

> In the case of chromium, copper, lead, nickel, zinc, and total cyanide, the discharge quantity (mass) shall be determined by multiplying the concentrations listed in the following table for these pollutants times the flow from metal-bearing waste streams for the metals and times the flow from cyanide bearing waste streams for total cyanide. The metal-bearing waste streams and cyanide-bearing waste streams are defined as those waste streams listed in Appendix A of this part, plus any additional OCPSF process wastewater streams identified by the permitting authority on a case-by-case basis as metal or cyanide bearing based upon a determination that such streams contain significant amounts of the pollutants identified above. Any such streams designated as metal or cyanide bearing must be treated independently of other metal or cyanide bearing waste streams unless the permitting authority determines that the combination of such streams, prior to treatment, with the Appendix A waste streams will result in substantial reduction of these pollutants. This determination must be based upon a review of relevant engineering, production, and sampling and analysis information.

Shell does not plan to generate any metals or cyanide-bearing waste streams (i.e., waste streams identified in Appendix A of Part 414, not waste streams that merely contain metals or cyanide) at the SPMS. Metals may be present in the process wastewater, but only in small concentrations as a result of pipe corrosion.

To the extent that DEP may discretionarily impose metals and cyanide limits from § 414.91 if DEP determines that those pollutants are present in significant amounts, Shell's estimated effluent quality at IMP 101 indicates that chromium, copper, lead, nickel, zinc and total cyanide are anticipated to be present in concentrations an order of magnitude less than the concentrations given in § 414.91. For that reason, the chromium, copper, lead, nickel, zinc, and total cyanide limits from § 414.91 will not be imposed at this time.

TBELs for Conventional Pollutants

Limits for the conventional pollutants BOD5 and TSS are subpart specific. For process wastewater discharges that are subject to more than one subpart like those from the SPMS, 40 CFR § 414.11(i) specifies the following procedure to calculate production-proportioned BOD5 and TSS effluent limits:

> BOD5 and TSS limitations for plants with production in two or more subcategories. Any existing or new source direct discharge point source subject to two or more of subparts B through H must achieve BOD5 and TSS discharges not exceeding the quantity (mass) determined by multiplying the total OCPSF process wastewater flow subject to subparts B through H times the following "OCPSF production-proportioned concentration": For a specific plant, let w_j be the proportion of the plant's total OCPSF production in subcategory j. Then the plant-specific production-proportioned concentration limitations are given by:

$$\text{Plant BOD}_5 \text{ Limit} = \sum_{j=B}^{H} \left(w_j\right)\left(BOD_5 Limit_j\right)$$

and

$$\text{Plant TSS Limit} = \sum_{j=B}^{H} \left(w_j\right)\left(TSS\ Limit_j\right).$$

> The "BOD5 Limit_j" and "TSS Limit_j" are the respective subcategorical BOD5 and TSS Maximum for Any One Day or Maximum for Monthly Average limitations.

BOD5 and TSS concentrations for the SPMS are calculated using the proportion of total production attributable to each subcategory (summarized in Table 3) and the BOD5 and TSS concentrations given in Subparts D and F (summarized in Table 4).

Table 3. Production for Subparts D and F

Subcategory	Subcategory Production (million tons/year)	Percentage of Total Production (w_j)
Subpart D	1.763 (PEU 1-3)	1.763/3.413 = 51.66%
Subpart F	1.65 (ECU)	1.65/3.413 = 48.34%

Table 4. New Source Performance Standards for Conventional Pollutants BOD5 and TSS

Parameter	Subpart D (§ 414.44)		Subpart F (§ 414.64)	
	Average Monthly (mg/L)	Maximum Daily (mg/L)	Average Monthly (mg/L)	Maximum Daily (mg/L)
BOD5	24	64	30	80
TSS	40	130	46	149

Production-Proportioned BOD_5 Conc. = $(w_D)(BOD_5\ Limit_D) + (w_F)(BOD_5\ Limit_F)$

Production-Proportioned TSS Conc. = $(w_D)(TSS\ Limit_D) + (w_F)(TSS\ Limit_F)$

Technology-based mass limits for BOD5 and TSS are then calculated using the production-proportioned concentrations derived from the formulas above and the facility's process wastewater flow rate (1.28 MGD).

Table 5. TBELs for Conventional Pollutants

Parameter	Production-Proportioned Concentration (mg/L)		Production-Proportioned Mass (lb/day)	
	Avg. Monthly	Max Daily	Avg. Monthly	Max Daily
BOD5	27	72	287	766
TSS	43	139	458	1,487
pH*	within the range of 6.0 to 9.0 at all times			

*NSPS under §§ 414.44 and 414.64 require that pH be within the range of 6.0 to 9.0 at all times.

Regulatory Effluent Standards and Monitoring Requirements

Based on applicable state regulations, the following effluent standards and monitoring requirements are imposed:

- Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(d)(1).
- Limits for pH (6.0 minimum and 9.0 maximum) will be imposed at Outfall 001 based on 25 Pa. Code § 95.2(1). These limits are the same as the NSPS for pH from 40 CFR Part 414 (see Table 5).
- Process wastewaters at IMP 101 may contain oil and grease; however, effluent standards for oil-bearing wastewaters given by 25 Pa. Code § 95.2(2) will be imposed at Outfall 001 rather than IMP 101 because the cooling tower blowdown that mixes with treated process wastewaters prior to discharge may also contain oil and grease. Even though no effluent standards are imposed at IMP 101, reporting will be required for oil and grease.
- An instantaneous maximum limit of 7.0 mg/L is imposed for dissolved iron in accordance with 25 Pa. Code §95.2(4).

Concentration-Based Limits for IMP 101

To supplement the mass limits calculated from the ELGs, DEP will also impose concentration limits under the authority of 40 CFR § 122.45(f)(2)[2] and pursuant to a guidance document titled, "Production Basis for NPDES Permits" developed with input from both DEP and EPA that recommends the imposition of concentration limits in addition to mass limits when a maximum production rate rather than a long-term average production rate is used to establish mass limits (for production-based ELGs). In accordance with the draft guidance document:

> "…the option of including concentration based effluent limits should be evaluated by the permit writer for use in addition to the mass limits pursuant to the Best Professional Judgment (BPJ) authority in Section 402(a)(1) of the Clean Water Act. This option is also discussed in the U.S. EPA NPDES Permit Writers Manual. This option includes the addition of both monthly average and daily maximum concentration limits from the appropriate subcategory tables in the development document for the specific subcategory and pollutants involved into the permits as effluent limits (not mass × flow at the facility.) The main reason for this approach is to assure proper operation and maintenance of the treatment facility during periods of low production. The major advantage of this approach is simplicity, and it in no way restricts production levels at the facility, since effluent concentrations from the treatment plant remain fairly constant over wide ranges of production levels. This approach is particularly

[2] 40 CFR §122.45(f)(2) states: "Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations."

useful at facilities where production is either moderately or highly variable and/or multiple production lines with a centralized treatment facility are involved. It is also useful at new facilities where production records do not exist and mass limits are based solely on production.

"The use of concentration limits also assures compliance with the unit production figures in the ELG, especially during low production periods when mass limits alone can be achieved without treatment in some cases. This approach provides concentration limits that will not change over time and also represent what BAT for the particular production line involved can achieve in a well-operated treatment facility. This approach is preferable to calculating a concentration limit using the current flow at the facility and the mass limits from the ELG, which often yields concentration limits far less stringent than what BAT can achieve. The use of existing waste flow at a facility also leads to a moving target since waste flows are constantly changing due to treatment times, breakdowns, and facility modifications. If there are multiple subcategories involved, whichever subcategory has the majority of the flow to the treatment plant is used as the basis for deriving the concentration limits."

Although 40 CFR Part 414 is not substantially production-based, the passages cited above and 40 CFR § 122.45(f)(2) provide the bases for imposing concentration limits in addition to the mass limits required by the ELGs. Shell will operate multiple production lines (one ECU and three PEUs) with a centralized treatment facility employed to treat process wastewaters from those production lines in addition to other sources such as contaminated storm water. The plant also will be a new facility with certain limits based solely on production estimates since no production records exist.

The concentration limits for toxic parameters come directly from § 414.91, which applies to both Subpart D and Subpart F wastes. The concentration limits for conventional pollutants will be the production-proportioned concentrations listed in Table 5. Since the mass limits required by the ELG are based on the facility's process wastewater flow rate and the concentrations given in the ELG, Shell should be able to comply with both sets of limits.

101.B. Water Quality-Based Effluent Limitations (WQBELs)

WQBELs will not be evaluated at this internal monitoring point. WQBELs are designed to protect water quality by ensuring that water quality standards are met in the receiving water and IMP 101 is not a final stream discharge location. Therefore, water quality limits will be evaluated at Outfall 001 where the combination of IMP 101's wastewaters and cooling tower blowdown from IMP 201 discharge to waters of the Commonwealth.

101.C. Effluent Limitations and Monitoring Requirements for IMP 101

Effluent limits applicable at IMP 101 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements. Since WQBELs are not applicable at IMP 101, effluent limits are based solely on TBELs, regulatory effluent standards and monitoring requirements. In addition to the average monthly and maximum daily concentration limits, instantaneous maximum concentration limits also are included in the permit. Instantaneous maximum limits are for compliance monitoring use by DEP personnel and do not need to be reported on monthly DMRs unless grab samples are taken in place of 24-hour composite samples. The magnitudes of the instantaneous maximum limits will be calculated by multiplying the maximum daily limits by 1.25 in accordance with the maximum daily-to-instantaneous maximum ratio given in Chapter 2, Section C of DEP's *Technical Guidance for the Development and Specification of Effluent Limitations*. IMP 101 limits and monitoring requirements are summarized in Table 6.

Table 6. Effluent Limits and Monitoring Requirements for IMP 101

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
BOD-5	287	766	27	72	90	40 CFR §§ 414.44 and 414.64
Total Suspended Solids	458	1,487	43	139	174	40 CFR §§ 414.44 and 414.64
Oil and Grease	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Acenaphthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acenaphthylene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acrylonitrile	1.03	2.59	0.096	0.242	0.302	40 CFR § 414.91
Anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91

Table 6 (continued). Effluent Limits and Monitoring Requirements for IMP 101

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Benzene	0.395	1.45	0.037	0.136	0.170	40 CFR § 414.91
Benzo(a)anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
3,4-Benzofluoranthene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Benzo(k)fluoranthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Benzo(a)pyrene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Bis(2-ethylhexyl) phthalate	1.10	2.98	0.103	0.279	0.348	40 CFR § 414.91
Carbon Tetrachloride	0.192	0.405	0.018	0.038	0.047	40 CFR § 414.91
Chlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
Chloroethane	1.11	2.86	0.104	0.268	0.335	40 CFR § 414.91
Chloroform	0.224	0.491	0.021	0.046	0.057	40 CFR § 414.91
2-Chlorophenol	0.331	1.05	0.031	0.098	0.122	40 CFR § 414.91
Chrysene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Di-n-butyl phthalate	0.288	0.608	0.027	0.057	0.071	40 CFR § 414.91
1,2-Dichlorobenzene	0.822	1.74	0.077	0.163	0.203	40 CFR § 414.91
1,3-Dichlorobenzene	0.331	0.470	0.031	0.044	0.055	40 CFR § 414.91
1,4-Dichlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
1,1-Dichloroethane	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
1,2-Dichloroethane	0.726	2.25	0.068	0.211	0.263	40 CFR § 414.91
1,1-Dichloroethylene	0.170	0.267	0.016	0.025	0.031	40 CFR § 414.91
1,2-trans-Dichloroethylene	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
2,4-Dichlorophenol	0.416	1.20	0.039	0.112	0.140	40 CFR § 414.91
1,2-Dichloropropane	1.63	2.46	0.153	0.230	0.287	40 CFR § 414.91
1,3-Dichloropropylene	0.309	0.470	0.029	0.044	0.055	40 CFR § 414.91
Diethyl phthalate	0.865	2.17	0.081	0.203	0.253	40 CFR § 414.91
2,4-Dimethylphenol	0.192	0.384	0.018	0.036	0.045	40 CFR § 414.91
Dimethyl phthalate	0.202	0.502	0.019	0.047	0.058	40 CFR § 414.91
4,6-Dinitro-o-cresol	0.833	2.96	0.078	0.277	0.346	40 CFR § 414.91
2,4-Dinitrophenol	0.758	1.31	0.071	0.123	0.153	40 CFR § 414.91
2,4-Dinitrotoluene	1.21	3.04	0.113	0.285	0.356	40 CFR § 414.91
2,6-Dinitrotoluene	2.72	6.85	0.255	0.641	0.801	40 CFR § 414.91
Ethylbenzene	0.341	1.15	0.032	0.108	0.135	40 CFR § 414.91
Fluoranthene	0.267	0.726	0.025	0.068	0.085	40 CFR § 414.91
Fluorene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Hexachlorobenzene	0.106	0.213	0.010	0.020	0.025	40 CFR § 414.91
Hexachlorobutadiene	0.213	0.523	0.020	0.049	0.061	40 CFR § 414.91
Hexachloroethane	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
Methyl Chloride	0.918	2.03	0.086	0.190	0.237	40 CFR § 414.91
Methylene Chloride	0.427	0.950	0.040	0.089	0.111	40 CFR § 414.91
Naphthalene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Nitrobenzene	0.288	0.726	0.027	0.068	0.085	40 CFR § 414.91
2-Nitrophenol	0.437	0.737	0.041	0.069	0.086	40 CFR § 414.91
4-Nitrophenol	0.769	1.32	0.072	0.124	0.155	40 CFR § 414.91
Phenanthrene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Phenol	0.160	0.277	0.015	0.026	0.032	40 CFR § 414.91
Pyrene	0.267	0.715	0.025	0.067	0.083	40 CFR § 414.91
Tetrachloroethylene	0.235	0.598	0.022	0.056	0.070	40 CFR § 414.91

Table 6 (continued). Effluent Limits and Monitoring Requirements for IMP 101

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Toluene	0.277	0.854	0.026	0.080	0.100	40 CFR § 414.91
1,2,4-Trichlorobenzene	11.9	29.6	0.068	0.140	0.175	40 CFR § 414.91
1,1,1-Trichloroethane	15.5	36.1	0.021	0.054	0.067	40 CFR § 414.91
1,1,2-Trichloroethane	4.49	12.8	0.021	0.054	0.067	40 CFR § 414.91
Trichloroethylene	3.42	7.37	0.021	0.054	0.067	40 CFR § 414.91
Vinyl Chloride	18.1	42.5	0.104	0.268	0.335	40 CFR § 414.91
pH	within the range of 6.0 to 9.0					40 CFR §§ 414.44 and 414.64 & 25 Pa. Code § 95.2(1)

Monitoring frequencies and sample types are imposed in accordance with the recommendations for process wastewater discharges from Chapter 6, Table 6-4 of DEP's *Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits*. Based on that guidance, flow must be measured continuously (metered); pH will require daily grab samples; oil and grease will require 1/week grab samples; volatile pollutants will require 1/week, 4-grabs/24-hours composite sampling and all of the remaining parameters will require 1/week 24-hour composite sampling.

EPA recognized that permittees could incur significant analytical costs as a result of frequent monitoring for the full list of parameters in 40 CFR § 414.91.[3] However, EPA left decisions on monitoring frequencies to individual permitting authorities to be determined on a case-by-case basis pursuant to 40 CFR § 122.44(i)(2).[4] Since actual effluent data are not available for Shell's treated process wastewater, which would allow DEP to determine whether specific organic parameters are present in the process wastewater effluent, the 1/week monitoring frequency assumed by EPA for the purposes of estimating the costs of complying with the OCPSF regulation will be required as described in the preceding paragraph. Data obtained after the SPMS begins operating may be used to support monitoring frequency reductions pursuant to EPA's *Interim Guidance for Performance-Based Reduction of NPDES Permit Monitoring Frequencies*.

[3] Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category, Volume II, pp. X-32 to X-36.

[4] 40 CFR § 122.44(i)(2): "Except as provided in paragraphs (i)(4) and (5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year."

Development of Effluent Limitations

IMP No.	201	**Design Flow (MGD)**	2.47
Latitude	N/A	**Longitude**	N/A

Wastewater Description: Cooling tower blowdown

The SPMS is still under construction. Estimated effluent characteristics for full operations have not changed. What follows is a partial reproduction of the effluent limit development sections for IMP 201 included in the 2016 permit amendment's fact sheet. IMP 201's effluent limits are unchanged from the 2016 permit amendment.

Effluent limits are imposed at IMP 201 rather than another monitoring location because 40 CFR § 125.3(f) prohibits compliance with technology-based treatment requirements through the use of "non-treatment" techniques such as flow augmentation (i.e., dilution). Since the wastewaters monitored at IMP 201 combine with other wastewaters before the next downstream monitoring location (Outfall 001), IMP 201 is the only point at which compliance with applicable technology-based performance standards may be determined without the interference of other wastewaters. This rationale is consistent with 40 CFR § 122.45(h), which allows for the imposition of effluent limitations on internal waste streams in these circumstances.

201.A. Technology-Based Effluent Limitations (TBELs)

Effluent Limitations Guidelines

Cooling tower blowdown is not regulated by 40 CFR Part 414. However, cooling tower blowdown is regulated by 40 CFR Part 423 – Steam Electric Power Generating Point Source Category. Although the SPMS will not be a strict steam electric power generating facility (Shell will operate a cogeneration unit in addition to the ethylene and polyethylene production units), the cooling tower blowdown limits under Part 423 reasonably inform DEP's permitting of Shell's cooling tower blowdown pursuant to Sections 304(b)(2)(B), 304(b)(4)(B), and 402(a)(1) of the Clean Water Act and implementing regulations under 40 CFR § 125.3, which allow for the establishment of effluent limits on a case-by-case basis using Best Professional Judgment (BPJ).

Section 423.11(j) defines "blowdown" as "the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practices." This definition does not include language specific to the steam electric power generating industry, so the performance standards applicable to "blowdown" under the Steam Electric Power Generating Point Source Category and the rationale given by EPA for those limits in documentation supporting the Steam Electric Power Generating ELGs are appropriate for blowdown discharged elsewhere.

Based on DEP's BPJ, cooling tower blowdown monitored at IMP 201 will be subject to the most stringent TBELs and narrative limitations from § 423.12(b) paragraphs (1) and (7) for Best Practicable Control Technology Currently Available (BPT) and § 423.13 paragraphs (d)(1) - (d)(3) for Best Available Technology Economically Achievable (BAT). TBELs based on the use of Best Conventional Pollutant Control Technology (BCT) are reserved under § 423.14, so BPT limits will control conventional pollutants in the facility's blowdown. DEP will not impose the chromium and zinc limits from 40 CFR § 423.13(d)(1). Based on the Development Document for the Steam Electric ELGs, chromium and zinc were included as pollutants of concern for discharges of cooling tower blowdown due to the widespread use of chromium and zinc-based corrosion inhibitors when the Steam Electric ELGs were developed and promulgated. Based on the list of chemical additives provided in Shell's NPDES permit amendment application, no chromium or zinc-based additives will be used at the facility, so DEP will forgo the chromium and zinc limits at this time. The applicable TBELs are summarized in Tables 7 and 8.

Table 7. 40 CFR Part 423 – Steam Electric BPT Effluent Limitations for IMP 201

Pollutant	Average Concentration (mg/L)	Maximum Concentration (mg/L)	Basis
Free Available Chlorine	0.2	0.5	40 CFR § 423.12(b)(7)
pH	within the range of 6.0 to 9.0		40 CFR § 423.12(b)(1)

Table 8. 40 CFR Part 423 – Steam Electric BAT Effluent Limitations for IMP 201

Pollutant	Average Concentration (mg/L)	Maximum Concentration (mg/L)	Basis
Free Available Chlorine	0.2	0.5	40 CFR § 423.13(d)(1)
The 126 priority pollutants contained in chemicals added for cooling tower maintenance	No detectable amount	No detectable amount	40 CFR § 423.13(d)(1)

Pollutant	Average of daily values for 30 consecutive days (mg/L)	Maximum for any 1 day (mg/L)	Basis
Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.			40 CFR § 423.13(d)(2)
At the permitting authority's discretion, instead of the monitoring specified in 40 CFR 122.11(b) compliance with the limitations for the 126 priority pollutants in paragraph (d)(1) of this section may be determined by engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR part 136.			40 CFR § 423.13(d)(3)

The most stringent TBELs from the BPT and BAT levels of control include the pH limits from Table 7 and all of the limits from Table 8.

Regulatory Effluent Standards and Monitoring Requirements

Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(b). Effluent standards for pH are imposed on industrial wastes by 25 Pa. Code § 95.2(1). The § 95.2(1) pH limits are the same as those imposed based on BPJ (see Table 7).

Thermal TBELs for Heated Discharges

No TBELs are developed to control thermal pollution. However, DEP's "Implementation Guidance for Temperature Criteria" and ORSANCO's Pollution Control Standards recommend/require the imposition of a maximum temperature limit of 110°F for public safety purposes. The 110°F instantaneous maximum temperature limit is treated as an effluent standard for heated discharges. The 110°F limit will be imposed at Outfall 001 (the final discharge location where public access is possible) assuming that thermal water quality-based effluent limitations are not applicable (see Section 001.B).

201.B. Water Quality-Based Effluent Limitations (WQBELs)

WQBELs will be evaluated at Outfall 001 where the combination of IMP 101's wastewaters and IMP 201's cooling tower blowdown discharge to waters of the Commonwealth.

201.C. Effluent Limitations and Monitoring Requirements for IMP 201

Effluent limits applicable at IMP 201 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements. Since WQBELs are not applicable at IMP 201, effluent limits are based solely on TBELs, regulatory effluent standards and monitoring requirements. IMP 201 limits and monitoring requirements are summarized in Table 9.

Table 9. Effluent Limits and Monitoring Requirements for IMP 201

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(b)
Free Available Chlorine	—	—	0.2	0.5	—	BPJ TBELs
pH	within the range of 6.0 to 9.0					BPJ TBELs
Narrative limits in Table 8 will be imposed as conditions in Part C of the amended permit.						

Based on DEP's Permit Writers' Manual, flow must be measured daily (metered); pH will require daily grab samples; and free available chlorine will require 1/week grab samples.

Development of Effluent Limitations

Outfall No.	001	**Design Flow (MGD)**	3.75
Latitude	40° 40' 22.996"	**Longitude**	-80° 20' 18.489"

Wastewater Description: Treated process water and storm water from the wastewater treatment plant (monitored at IMP 101) and cooling tower blowdown (monitored at IMP 201)

The SPMS is still under construction. Estimated effluent characteristics for full operations have not changed. What follows is a partial reproduction of the effluent limit development sections for Outfall 001 included in the 2016 permit amendment's fact sheet. Some requirements at Outfall 001 have changed due to DEP's implementation of ORSANCO's Pollution Control Standards for bioaccumulative pollutants as explained in Section 001.B below.

001.A. Technology-Based Effluent Limitations (TBELs)

Federal ELGs and BPJ TBELs that are applicable to the individual sources contributing to discharges at Outfall 001 are imposed at IMPs 101 and 201 pursuant to 40 CFR § 122.45(h). Therefore, no TBELs will be imposed at Outfall 001. However, regulatory effluent standards and monitoring requirements will be imposed.

Regulatory Effluent Standards and Monitoring Requirements

- Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(d)(1).
- Effluent standards for pH (6.0 minimum and 9.0 maximum) will be imposed at Outfall 001 based on 25 Pa. Code § 95.2(1).
- As oil-bearing wastewater, discharges from Outfall 001 are subject to effluent standards for oil and grease from 25 Pa. Code § 95.2(2).
- A maximum temperature limit of 110°F will be imposed if thermal WQBELs are not applicable at Outfall 001 due to residual heat from cooling tower blowdown (refer to Section 001.B, below). The 110°F temperature limit is imposed pursuant to DEP guidance and ORSANCO's Pollution Control Standards to protect human health caused by exposure resulting from water contact.
- Based on the proposed use of chlorine-containing additives, residual chlorine may be present in Outfall 001's effluent. Therefore, TRC limits will be imposed at Outfall 001 pursuant to 25 Pa. Code § 92a.48(b)(2).

25 Pa. Code § 95.10 - Treatment requirements for new and expanding mass loadings of Total Dissolved Solids

Section 95.10 of 25 Pa. Code Chapter 95 was promulgated on August 21, 2010 and was intended to address the limited assimilative capacity of Pennsylvania's rivers and streams for Total Dissolved Solids (TDS). The regulation exempts existing mass loadings of TDS from treatment requirements, while new or expanding mass loadings of TDS are subject to the treatment requirements specified in the regulation. DEP's guidance document titled "Policy and Procedure for NPDES Permitting of Discharges of Total Dissolved Solids (TDS) -- 25 Pa. Code §95.10" provides additional explanation of the implementation procedures for the regulation as follows:

> "Integral to the implementation of §95.10 is the principle that existing, authorized mass loadings of TDS are exempt from any treatment requirements under §95.10. Section 95.10(a)(1) effectively exempts any existing mass loading of TDS up to and including the maximum daily discharge loading for any existing discharge, provided that the loading was authorized prior to August 21, 2010. In addition, §95.10 (a)(7) sets a de minimus threshold value of 5,000 lb/d on an average annual basis, below which DEP will not consider the expanding mass loading as sufficient to trigger the treatment requirements. If there is a net increase in TDS loading of more than 5,000 lb/d above the previously authorized loading, treatment requirements may be required for certain discharges, but the treatment requirements are only applicable for the expanding mass loading (the wastewater associated with the portion of the loading in excess of the existing mass loading, as per §95.10 (a)(1)(ii))."
>
> "…Generally, existing mass loadings need be evaluated only at the point that an existing discharge proposes a hydraulic expansion or a change of wastestream. Existing mass loadings should be expressed on both an average daily and a maximum daily basis in order to conform with the requirements of §95.10 (a)(1) and (7)."

Shell requested to maintain the NPDES permit previously issued to Horsehead Corporation (NPDES PA0002208), in part, to maintain the existing TDS loading that was implicitly authorized under that NPDES permit for discharges from Horsehead Corporation's Monaca Zinc Smelter. Shell's request is not necessarily consistent with the intent of § 95.10 given that the change of waste stream and/or hydraulic expansion envisioned by the regulation is supposed to be to an existing waste stream at an existing facility and not a new discharge from a completely new facility conducting different industrial activities. However, the net effect on the receiving water is essentially the same between Horsehead's TDS discharge loading and Shell's proposed TDS discharge loading. That is, the Ohio River previously received a certain load of TDS from a discharger located at the Monaca site and will continue to receive a load of TDS from another discharger at the same site. The concentrations of the dissolved constituents making up total dissolved solids may be different, but as long as the new discharger's TDS loading is equal to or less than the TDS loading previously authorized for Horsehead, there will be no net reduction in the river's capacity to assimilate TDS.

Based on DEP's analysis of Horsehead's TDS discharges (included in Attachment A of this Fact Sheet), the existing TDS discharge loading authorized prior to August 21, 2010 is 65,556 lb/day average and 73,184 lb/day maximum. Shell's estimated TDS discharge loading for process wastewaters is 50,078 lb/day.[5] Since the proposed TDS discharge loading is less than the existing authorized TDS loading, Shell's process wastewater discharge will be exempt from § 95.10's treatment requirements pursuant to the exemptions in §§ 95.10(a)(1) and (7).

Although § 95.10's treatment requirements will not be imposed, the existing average and maximum TDS discharge loads will be included in a Part C condition in the amended permit. Specifying existing authorized loads will allow for future evaluations of the need to impose § 95.10's treatment requirements if there are changes to waste streams and/or hydraulic expansions at the SPMS.

001.B. Water Quality-Based Effluent Limitations (WQBELs)

Toxics Screening Analysis – Procedures for Evaluating Reasonable Potential and Developing WQBELs

The procedures for evaluating reasonable potential are as follows:

1. For industrial waste discharges, the design flow to use in modeling is the average flow during production or operation unless another flow value is more appropriate.

2. Perform a Toxics Screening Analysis to identify toxic pollutants of concern. All toxic pollutants whose maximum concentrations, as reported in the permit application or on DMRs, are greater than the most stringent applicable water quality criterion are pollutants of concern. [This includes pollutants reported as "Not Detectable" or as "<QL" where the quantitation limit for the analytical method used by the applicant is greater than DEP's target quantitation limit]. List all toxic pollutants of concern in a Toxics Screening Analysis section of the fact sheet (see Attachment B).

3. For any outfall with an applicable design flow, perform PENTOXSD modeling for all pollutants of concern. Use the maximum reported value from the application form or from DMRs as the input concentration for the PENTOXSD model run.

4. Compare the actual WQBEL from PENTOXSD with the maximum concentration reported on DMRs or the permit application. Use WQN data or another source to establish the existing or background concentration for naturally occurring pollutants, but generally assume zero background concentration for non-naturally occurring pollutants.

    - Establish limits in the draft permit where the maximum reported concentration equals or exceeds 50% of the WQBEL. Use the average monthly and maximum daily limits for the permit as recommended by PENTOXSD. Establish an IMAX limit at 2.5 times the average monthly limit.

    - For non-conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL.

    - For conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 10% - 50% of the WQBEL.

[5] TDS present in cooling tower blowdown and non-contact cooling waters that are sourced from the same stream that receives discharges of those wastewaters does not count as part of a facility's TDS discharge loading because a closed-cycle cooling system merely concentrates the natural concentrations of TDS from the stream and does not represent a net increase in TDS loading.

The information described above including the maximum reported discharge concentrations, the most stringent water quality criteria, the pollutant-of-concern (reasonable potential) determinations, the calculated WQBELs, and the WQBEL/monitoring recommendations is collected on a spreadsheet titled "Toxics Screening Analysis." (Attachment B).

PENTOXSD Water Quality Modeling Program

PENTOXSD Version 2.0 for Windows is a single discharge, mass-balance water quality modeling program that includes consideration for mixing, first-order decay and other factors to determine recommended WQBELs for toxic substances and several non-toxic substances. Required input data including stream code, river mile index, elevation, drainage area, discharge name, NPDES permit number, and discharge flow rate are entered into PENTOXSD to establish site-specific discharge conditions. Other data such as low-flow yield, reach dimensions, and partial mix factors also may be entered to further characterize the conditions of the discharge and receiving water. Pollutants are then selected for analysis based on those present or likely to be present in a discharge at levels that may cause, have the reasonable potential to cause, or contribute to excursions above state water quality standards (i.e., a reasonable potential analysis). Discharge concentrations for the selected pollutants generally are chosen to represent the "worst case" quality of the discharge (i.e., maximum reported discharge concentrations). PENTOXSD then evaluates each pollutant by computing a Waste Load Allocation for each applicable criterion, determining a recommended maximum WQBEL, and comparing that recommended WQBEL with the input discharge concentration to determine which is more stringent. Based on this evaluation, PENTOXSD recommends average monthly and maximum daily WQBELs.

Reasonable Potential Analysis and WQBEL Development for Outfall 001

Discharges from Outfall 001 are evaluated based on concentrations reported on the application, which are engineering estimates of expected effluent quality because the SPMS is not operating yet. The PENTOXSD model is run with the modeled discharge and receiving stream characteristics shown in Table 10. The pollutants selected for analysis are those identified as candidates for modeling by the Toxics Screening Analysis. Pollutants for which water quality standards have not been promulgated (e.g., TSS, oil and grease, etc.) are excluded from the PENTOXSD modeling.

Table 10. 001 PENTOXSD Inputs

Parameter	Value
River Mile Index	952.70
Discharge Flow (MGD)	3.75
Basin/Stream Characteristics	
Parameter	**Value**
Area in Square Miles	22,771.80
Q_{7-10} (cfs)	4,730
Low-flow yield (cfs/mi^2)	0.21
Elevation (ft)	681.80
Partial Mix Factor	0.2

A partial mix factor of 0.2 is used for the chronic fish criteria (CRC), threshold human health (THH) and cancer risk level (CRL) analyses in PENTOXSD. DEP uses partial mix factors (PMFs) in PENTOXSD modeling to represent the fractional portion of the receiving stream that mixes with a discharge. A PMF of 0.2 provides the permittee with 20% of the receiving stream's Q_{7-10} flow for mixing and dilution. A PMF was manually input because PENTOXSD, as a single discharge model, allocates high percentages of stream flow to individual discharges, which often results in those discharges being modeled with most or all of a stream's assimilative capacity. This would represent a significant dilution allowance on a large waterway like the Ohio River, which has a high Q_{7-10} (actually a minimum flow regulated by the US Army Corps of Engineers using a series of dams) and would leave little or no assimilative capacity for other dischargers to the same receiving stream.

Output from the PENTOXSD model is included in Attachment C. The WQBELs calculated using PENTOXSD are compared to the maximum reported effluent concentrations as described above to evaluate the need to impose WQBELs or monitoring requirements in the permit. Based on the Toxics Screening Analysis's recommendations and DEP's judgement, the requirements shown in Table 11 are applicable at Outfall 001.

Table 11. Outfall 001 WQBELs and monitoring requirements

Parameter	Concentration (mg/L)		
	Average Monthly	Maximum Daily	Instant Maximum
Total Dissolved Solids	Report	Report	—
Chloride	Report	Report	—
Bromide	Report	Report	—
Sulfate	Report	Report	—
Aluminum, Total	Report	Report	—
Chromium, Hexavalent	Report	Report	—
Copper, Total	Report	Report	—
Benzene	Report	Report	—

Note that the Toxics Screening Analysis does not recommend WQBELs or reporting for benzene because there have been updates to the spreadsheet's logic since the permit was last amended. However, the benzene reporting requirements currently imposed at Outfall 001 will be maintained in the renewed permit.

The Toxics Screening Analysis' reporting recommendations for TDS, chloride, bromide and sulfate are the result of a new monitoring initiative. TDS and its major constituents including chloride, bromide and sulfate have emerged as pollutants of concern in several major watersheds in the Commonwealth. The conservative nature of these solids allows them to accumulate in surface waters and they may remain a concern even if the immediate downstream public water supply is not directly impacted. Bromide has been linked to the formation of disinfection byproducts at increased levels in public water systems. In addition, the Environmental Quality Board has directed DEP to collect additional data related to sulfate and chloride. Furthermore, EPA has expressed concern related to bromide and the importance of monitoring all point sources for bromide when it may be present.

Based on the concerns identified above and under the authority of 25 Pa. Code § 92a.61, DEP has determined that it will implement monitoring in NPDES permits for TDS, chloride, bromide and sulfate. The monitoring is prompted for discharges that exceed the following thresholds:

- Where the concentration of TDS in the discharge exceeds 1,000 mg/L, or the net TDS load from a discharge exceeds 20,000 lb/day, and the discharge flow exceeds 0.1 MGD, the permit should include monitoring requirements for TDS, chloride, bromide and sulfate. For discharges of 0.1 MGD or less, the permit should include monitoring requirements for TDS, sulfate, chloride, and bromide if the concentration of TDS in the discharge exceeds 5,000 mg/L.

- Where the concentration of bromide in a discharge exceeds 1 mg/L and the discharge flow exceeds 0.1 MGD or where concentration of bromide exceeds 10 mg/L for discharges of 0.1 MGD or less, establish a monitoring requirement for bromide.

Thermal Limits

Thermal WQBELs are evaluated using a DEP program called "Thermal Discharge Limit Calculation Spreadsheet" created with Microsoft Excel for Windows. This program calculates temperature wasteload allocations (WLAs) through the application of a heat transfer equation, which takes two forms in the program depending on the source of the facility's cooling water. In Case 1, intake water to a facility is from the receiving stream upstream of the discharge location. In Case 2, intake water is from a source other than the receiving stream (e.g., municipal water supply). The determination of which case applies to a given discharge is made based on the input data which include the receiving stream flow rate ($Q_{7\text{-}10}$ or other as appropriate), the stream intake flow rate, external source intake flow rates, consumptive flow rates, and site-specific ambient stream temperatures. Case 1 limits are generally expressed as heat rejection rates while Case 2 limits are usually expressed as temperatures.

DEP's *Implementation Guidance for Temperature Criteria* directs permit writers to assume instantaneous complete mixing of the discharge with the receiving stream when calculating thermal effluent limits unless adverse factors exist. One such factor listed in the guidance is that the "discharge is to a receiving water that is very wide, resulting in restricted dispersion of the plume, and horizontal stratification of the plume." Since wastewaters from Outfall 001 will be discharged to the Ohio River at the riverbank and not out into the main flow channel, the dispersion of the discharge plume is likely to be limited and instantaneous complete mixing will not occur. Therefore, a PMF of 0.2 will be applied to the receiving stream's low flow for the thermal limit analysis (0.2 × 4,730 cfs = 946 cfs). As stated previously, a PMF of 0.2 provides the permittee with 20% of the Ohio River's flow for mixing and dilution.

Shell will source its water from the Ohio River using an existing intake structure located on the property. Although Outfall 001 and Shell's intake are both located on the Ohio River, the intake is located approximately 0.6 miles downstream of the discharge; this does not trigger a Case 1 thermal analysis because a downstream intake would not affect the assimilative capacity at the upstream outfall. For this reason, the discharge is analyzed as Case 2.

The results of the thermal discharge analysis using the Thermal Discharge Limit Calculation Spreadsheet (included in Attachment D) show that WQBELs for temperature are not required. Therefore, a maximum temperature limit of 110°F will be imposed pursuant to ORSANCO's Pollution Control Standards and DEP's temperature guidance.

Total Residual Chlorine

To determine if WQBELs are required for discharges containing TRC, a discharge evaluation is performed using a DEP program called TRC_CALC created with Microsoft Excel for Windows. TRC_CALC calculates TRC waste load allocations

through the application of a mass balance model which considers TRC losses due to stream and discharge chlorine demands and first-order chlorine decay. Input values for the TRC_CALC program include flow rates and chlorine demands for the receiving stream and the discharge (default chlorine demands of 0.3 and 0.0, respectively), the number of samples taken per month, coefficients of TRC variability, partial mix factors and an optional factor of safety. The mass balance model calculates waste load allocations for acute and chronic criteria that are then converted to long term averages using calculated multipliers. The multipliers are functions of the number of samples taken per month and the TRC variability coefficients (normally kept at default values unless site specific information is available). The most stringent limitation between the acute and chronic long-term averages is converted to an average monthly limit for comparison to the BAT average monthly limit of 0.5 mg/L from 25 Pa. Code § 92a.48(b)(2). The more stringent of these average monthly TRC limits is imposed in the permit.

The stream flow and discharge flow entered into the TRC_CALC spreadsheet are 4,730 cfs and 3.75 MGD, respectively. A PMF of 0.2 is input for the CFC criteria and a PMF of 0.066 (calculated from the PENTOXSD analysis) is input for the AFC criteria. The results of the analysis, included in Attachment E, indicate that no WQBELs are required for TRC.

ORSANCO Pollution Control Standards

The Ohio River Valley Water Sanitation Commission (ORSANCO)—an interstate commission established by interstate compact—sets water quality standards (Pollution Control Standards or "ORSANCO's Standards") that apply to the Ohio River, a surface water of the Commonwealth, and the receiving water for the SPMS's discharges. DEP implements ORSANCO's Standards pursuant to 25 Pa. Code § 93.2(b), which states:

> When an interstate or international agency under an interstate compact or international agreement establishes water quality standards regulations applicable to surface waters of this Commonwealth, including wetlands, more stringent than those in this title, the more stringent standards apply.

Chapter 4, Section F.4 of the 2019 ORSANCO Standards states, among other things, that:

> F. 4. Mixing zones shall continue to be prohibited for [bioaccumulative chemicals of concern] BCCs for discharges from facilities that came into existence after October 16, 2003.

The SPMS will be completed within the next couple years (i.e., after October 16, 2003), which means that BCCs in the facility's discharges are not eligible for a mixing zone allowance. DEP's regulations do not define mixing zones or the conditions under which mixing zones can be used for water quality standards implementation. However, PENTOXSD uses criteria compliance times that establish the locations where compliance with water quality criteria is expected to occur. For acute aquatic life criteria, the maximum criteria compliance time is fifteen minutes or the travel time until a discharge has completely mixed with the receiving stream, whichever occurs first. For chronic aquatic life criteria and human health criteria (threshold and cancer risk), the maximum criteria compliance time is twelve hours or the travel time until a discharge has completely mixed with the receiving stream, whichever occurs first.[6] In effect, PENTOXSD's criteria compliance times, the discharge flow rate, and the receiving stream's flow rate and cross-sectional area define the mixing zone allowable for each pollutant analyzed.

Per ORSANCO's Standards, BCCs include the following: lindane, hexachlorocyclohexane, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, delta-hexachlorocyclohexane, hexachlorobutadiene, photomirex, 1,2,4,5-tetrachlorobenzene, toxaphene, pentachlorobenzene, 1,2,3,4-tetrachlorobenzene, mirex, hexachlorobenzene, chlordane, DDD, DDT, DDE, octachlorostyrene, PCBs, 2,3,7,8-TCDD, mercury, and dieldrin. Most of those compounds are pesticides or are associated with pesticides that are no longer in use but that persist in the environment. The following BCCs are not expected to be present in SPMS's effluent and will not be subject to any requirements in the permit: lindane, hexachlorocyclohexane and its isomers, mirex, photomirex, chlordane, DDD, DDT, DDE, octachlorostyrene, PCBs, 2,3,7,8-TCDD, and dieldrin. If post-startup sampling and analyses indicate that one or more of those parameters are present in the discharge, then requirements for those parameters may be revisited.

Hexachlorobutadiene is regulated at IMP 101 as are other chlorobenzenes. Also, even though Shell does not expect mercury in its effluent, other nearby facilities that withdraw water from the Ohio River and use that water for cooling purposes report low, but detectable concentrations of mercury in their effluent. For those reasons and pursuant to 25 Pa. Code § 92a.61(b), quarterly reporting will be required at Outfall 001 for the following: hexachlorobutadiene, 1,2,4,5-tetrachlorobenzene, pentachlorobenzene, 1,2,3,4-tetrachlorobenzene, hexachlorobenzene, and mercury. Data from the

[6] Per 25 Pa. Code § 96.3(d), the criteria compliance time for total dissolved solids, nitrite-nitrate nitrogen, phenolics, chloride, sulfate, and fluoride is 12 hours or the travel time to the nearest downstream potable water supply withdrawal.

reporting will be used to determine if BCCs regulated through DEP's implementation of ORSANCO's Standards require effluent limits that will ensure compliance with water quality standards at the point of discharge—subject to potential variances and intake allowances as described in Sections 1.6 and 5.5 of ORSANCO's Standards. DEP also notes that some of the BCCs do not have Pennsylvania or ORSANCO water quality criteria, so ORSANCO's mixing zone requirements have no effect on those BCCs at this time.

For mercury, Shell will be required to use low-level analytical methods to enable comparisons of its analytical results to ORSANCO's criterion.

Section 5.1.B of ORSANCO's Standards requires a permanent marker at each outfall discharging directly to the Ohio River. That requirement is imposed in Part C of Shell's current permit and will be maintained.

Ohio River TMDL for PCBs and Chlordane

DEP has a final approved TMDL for the Ohio River dated April 9, 2001. The TMDL addresses fish consumption use impairments caused by PCBs and chlordane. As explained in the section above pertaining to mixing zones, PCBs and chlordane are not expected to be present in Shell's effluent, so Shell is unaffected by the TMDL.

001.C. Effluent Limitations and Monitoring Requirements for Outfall 001

Effluent limits applicable at Outfall 001 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements as summarized in Table 12.

Table 12. Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
Oil and Grease	—	—	15.0	—	30.0	25 Pa. Code § 95.2(2)
Temperature (°F)	—	—	—	—	110	ORSANCO Pollution Ctrl Stds.
Total Residual Chlorine	—	—	0.5	1.0	1.25	25 Pa. Code § 92a.48(b)(2)
Total Dissolved Solids	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Bromide, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Chloride, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Sulfate, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Aluminum, Total	—	—	Report	Report	—	§ 92a.61(b) Reasonable Potential
Chromium, Hexavalent	—	—	Report	Report	—	§ 92a.61(b) Reasonable Potential
Benzene	—	—	Report	Report	—	§ 92a.61(b) Reasonable Potential
Mercury, Total	—	—	—	Report	—	ORSANCO; § 92a.61(b)
Pentachlorobenzene	—	—	—	Report	—	ORSANCO; § 92a.61(b)
Hexachlorobenzene	—	—	—	Report	—	ORSANCO; § 92a.61(b)
Hexachlorobutadiene	—	—	—	Report	—	ORSANCO; § 92a.61(b)
1,2,4,5-Tetrachlorobenzene	—	—	—	Report	—	ORSANCO; § 92a.61(b)
1,2,3,4-Tetrachlorobenzene	—	—	—	Report	—	ORSANCO; § 92a.61(b)
pH	within the range of 6.0 to 9.0					25 Pa. Code § 95.2(1)

Based on DEP's Permit Writers' Manual, flow must be measured daily (metered). Oil and grease and pH will require daily grab samples. Temperature must be monitored daily using immersion stabilization sampling. Benzene and TRC will require 1/week grab sampling and all remaining parameters will require 1/week 24-hour composite sampling. Hexachlorobutadiene, 1,2,4,5-tetrachlorobenzene, pentachlorobenzene, 1,2,3,4-tetrachlorobenzene, hexachlorobenzene, and mercury will require 1/quarter grab sampling.

Development of Effluent Limitations

Outfall Nos. 002, 003, 006-010, 012-014, 016-023 **Design Flow (MGD)** Variable
Wastewater Description: Storm water

Storm water outfalls at the SPMS are listed in Table 13. The storm water discharged at those outfalls is storm water associated with industrial activities. However, Shell has separated the storm water runoff that may be contaminated by activities in process areas of the site (i.e., "accidentally contaminated" storm water that will be managed as process wastewater) from storm water runoff from other areas of the site with less potential for contamination like runoff from administration buildings. Shell did not claim that any of the storm water outfalls are not exposed to industrial activities.

Table 13. Storm Water Outfalls

Outfall	Drainage Area (ft^2)	Description
002	1,028,016	East Railroad Pond
003	—	East Railroad Pond Overflow
006	3,576,276	South Ponds
007	—	South Ponds' Overflow
008	3,798,432	Clean Rainwater (CR) Pond
009	—	Clean Rainwater Pond Overflow
010	165,825	West Railroad Basin
012	—	West Railroad Basin Overflow
013	4,578,156	North Pond
014	—	North Pond Overflow
016	374,180	Storm water from plant and both Duquesne and PennDOT rights-of-way
017	458,687	Storm water runoff from wastewater treatment plant area
018	625,957	Parking Area Pond A West
019	—	Parking Area Pond A West Overflow
020	614,196	Parking Area Pond B East
021	1,128,204	Storm water runoff from Electric Tower Road
022	—	Parking Area Pond B East Overflow
023	933,491	Storm water runoff from the Training Center

Outfall 016 originally was authorized as 'interim' Outfall 008 in the 2016 permit amendment—a construction-related storm water discharge that eventually would be eliminated. The discharge was continued as a separate outfall from 'final' Outfall 008 (the Clean Rainwater Pond discharge) pursuant to an August 17, 2018 letter from DEP. Outfalls 017 through 023 are new storm water discharge locations added with this permit renewal.

SWO.A. Technology-Based Effluent Limitations (TBELs)

Storm water discharged from the SPMS is not subject to any federal ELGs. Therefore, effluent limits and/or monitoring requirements will be developed based on applicable state regulations and guidance.

Regulatory Monitoring Requirements

A reporting requirement for flow will be imposed in accordance with 25 Pa. Code § 92a.61(h).

Storm Water Monitoring Requirements

Pursuant to 25 Pa. Code § 92a.61(h) and in accordance with DEP's policy for permitting storm water discharges associated with industrial activities described in Section III of DEP's "Standard Operating Procedure (SOP) for Clean Water Program – Establishing Effluent Limitations for Individual Industrial Permits", minimum monitoring requirements and BMPs described in the PAG-03 will be applied to Shell's storm water discharges. Based on Shell's SIC Codes of 2821 and 2869, the facility will be classified under Appendix F – Chemicals and Allied Products of the PAG-03 General Permit.[7] In order to ensure that there is baseline consistency across the state for all chemical and allied products facilities that discharge storm water associated with their industrial activities, the monitoring requirements of Appendix F of the PAG-03 will be imposed at SPMS's storm water outfalls. The Appendix F monitoring requirements are shown in Table 14.

[7] The determination of which of the PAG-03 General Permit's appendices applies to a facility is based on a facility's SIC Code.

Table 14. PAG-03 Appendix F – Minimum Monitoring Requirements

Parameter	Measurement Frequency	Sample Type	Benchmark Values
pH (S.U.)	1 / 6 months	Grab	XXX
Chemical Oxygen Demand (COD)	1 / 6 months	Grab	120
Total Suspended Solids (TSS)	1 / 6 months	Grab	100
Nitrate + Nitrite-Nitrogen	1 / 6 months	Grab	XXX
Total Phosphorus	1 / 6 months	Grab	XXX
Total Lead	1 / 6 months	Grab	XXX
Total Zinc	1 / 6 months	Grab	XXX
Total Iron	1 / 6 months	Grab	XXX
Total Aluminum	1 / 6 months	Grab	XXX

The benchmark values listed in Table 14 are not effluent limitations and exceedances do not constitute permit violations. However, if the permittee's sampling demonstrates exceedances of benchmark values for two consecutive monitoring periods, the permittee must submit a corrective action plan within 90 days of the end of the monitoring period triggering the plan. That requirement and the benchmark values will be specified in a condition in Part C of the permit.

Overflow discharges through Outfalls 003, 007, 009, 012, 014, 019, and 022 will be subject to the same monitoring requirements as the primary discharge locations from the site's storm water ponds and basins because overflows are also storm water discharges associated with industrial activities. The monitoring frequencies for overflow discharges will be 1/discharge because overflows are not expected to occur with any regularity. However, since overflows could occur at any time, Discharge Monitoring Reports for overflows must be submitted monthly rather than semi-annually.

Additional Parameters

In addition to the parameters listed in Table 14, monitoring requirements for mercury, selenium, and thallium will be maintained at the SPMS's storm water outfalls pursuant to 25 Pa. Code § 92a.61(h). Effluent data indicate those parameters are present at outfalls with reported storm water discharges, albeit typically at low concentrations.

SWO.B. Water Quality-Based Effluent Limitations (WQBELs)

Generally, DEP does not develop numerical WQBELs for storm water discharges. Pursuant to 25 Pa. Code § 96.4(g), mathematical modeling used to develop WQBELs must be performed at $Q_{7\text{-}10}$ low flow conditions. Precipitation-induced discharges generally do not occur at $Q_{7\text{-}10}$ design conditions because the precipitation that causes a storm water discharge also will increase the receiving stream's flow and that increased stream flow will provide additional assimilative capacity during a storm event.

Even though no mathematical modeling is performed, conditions in Part C of the permit will ensure compliance with water quality standards through a combination of best management practices including pollution prevention and exposure minimization, good housekeeping, erosion and sediment control, and spill prevention and response.

SWO.C. Effluent Limitations and Monitoring Requirements for Storm Water Outfalls

Effluent limits applicable at Outfalls 002, 003, 006-010, 012-014, 016-023 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements. Since there are no data on which to base an evaluation of storm water quality, monitoring requirements are based solely on the PAG-03 General Permit.

Table 15. Effluent limits and monitoring requirements for Outfalls 002, 003, 006–010, 012–014, 016–023

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	—	Report	—	—	—	25 Pa. Code § 92a.61(h)
Chemical Oxygen Demand	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F
Total Suspended Solids	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F
Nitrate + Nitrite-Nitrogen	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F

Table 15 (cont'd). Effluent limits and monitoring requirements for Outfalls 002, 003, 006–010, 012–014, 016–023

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Phosphorus, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F
Lead, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F
Zinc, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F
Iron, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F
Aluminum, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F
Mercury, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h)
Selenium, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h)
Thallium, Total	—	—	—	Report	—	25 Pa. Code § 92a.61(h)
pH	—	—	—	Report	—	25 Pa. Code § 92a.61(h); PAG-03, Appendix F

Based on the measurement frequency and sample types given in Appendix F of the PAG-03 General Permit, all parameters should be monitored 1 / 6 months using grab sampling. Overflow outfalls will require 1/discharge grab sampling. Flow should be estimated at the time of sampling.

Development of Effluent Limitations

IMP No.	108	**Design Flow (MGD)**	Variable
Latitude	N/A	**Longitude**	N/A

Wastewater Description: Hydrostatic test water

Internal Monitoring Point 108 is a monitoring point for water that may be discharged from hydrostatic testing of tanks and/or pipes through either Outfall 008 or Outfall 013 depending on where at the site the hydrostatic testing occurs.

108.A. Technology-Based Effluent Limitations (TBELs)

Hydrostatic test water will be subject to the discharge requirements specified in Appendix L of the PAG-03 General Permit for hydrostatic test water discharges and the existing tanks and pipelines discharge requirements from the PAG-10 General Permit for Discharges Resulting from Hydrostatic Testing of Tanks and Pipelines (excluding the requirements for PCBs). Although tanks and pipelines at the SPMS will be new, hydrostatic testing will not necessarily be restricted to plant startup when pipelines and tanks will be free of product.

108.B. Water Quality-Based Effluent Limitations (WQBELs)

WQBELs are designed to protect water quality by ensuring that water quality standards are met in the receiving water and IMP 108 does not discharge directly to waters of the Commonwealth. Therefore, WQBELs are not developed for this monitoring location. Regardless of whether Outfall 008 or 013 receives the effluent, intermittent hydrostatic test water discharges to the Ohio River at the concentrations specified at IMP 108 are not expected to cause or contribute to water quality criteria violations.

108.C. Effluent Limitations and Monitoring Requirements for IMP 108

Effluent limits applicable at IMP 108 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements as summarized in Table 16. There are no WQBELs, so limits are based solely on TBELs and related monitoring requirements.

Table 16. Effluent Limits and Monitoring Requirements for IMP 108

Pollutant	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(b)
Benzene	—	—	—	—	0.0025	PAG-03, App. L & PAG-10
Total BTEX	—	—	—	—	0.25	PAG-10
Oil and Grease	—	—	15	—	30	PAG-03, App. L & PAG-10
Total Suspended Solids	—	—	30	—	60	PAG-03, App. L & PAG-10
Dissolved Iron	—	—	—	—	7.0	PAG-03, App. L & PAG-10
Total Residual Chlorine	—	—	—	—	0.05	PAG-03, Appendix L
pH	—	—	6.0 (Min)	—	9.0 (Max)	PAG-03, Appendix L

The monitoring frequencies for oil and grease, TSS and pH will be set at 2/discharge with grab sampling. All other parameters will require 1/ discharge grab sampling. Flow should be estimated at the time of sampling.

Development of Effluent Limitations

Outfall No. 004 **Design Flow (MGD)** Variable
Latitude 40° 39' 57.4943" **Longitude** -80° 20' 40.5531"
Wastewater Description: Overflows of storm water from the Accidentally Contaminated (AC) Pond

The Accidentally Contaminated ("AC") Pond is actually a concrete tank. Shell previously proposed to use a pond for the collection of excess storm water from process areas, off-spec effluent, and contaminated cooling tower blowdown. However, the AC Pond's design did not comply with residual waste storage impoundment regulations at 25 Pa. Code Chapter 299. Shell did not want to delay issuance of the Water Quality Management ("WQM") permit or construction of the rest of the wastewater treatment plant authorized by that WQM permit while the AC Pond was redesigned to comply with Chapter 299. Therefore, WQM Permit 0417201 was issued on May 15, 2018 with Special Condition "A", which excluded the AC Pond from the approved treatment facilities. Ultimately, Shell decided to change the AC Pond from a residual waste storage impoundment subject to regulation under Chapter 299 to an in-ground, 342,375 ft^3 reinforced concrete tank. The tank is not subject to Chapter 299. The modified design was permitted by a WQM Permit amendment issued on January 25, 2019.

004.A. Technology-Based Effluent Limitations (TBELs)

Under normal operating conditions, storm water runoff from process areas of the SPMS will be collected in the AC Pond, treated by the industrial wastewater treatment plant along with process wastewaters, and discharged through Outfall 001. During significant rainfall events, the AC Pond may overflow and discharge through Outfall 004.

Since wastewaters collected in the AC Pond normally will be treated as process wastewaters, it is appropriate that any bypass of the treatment system—such as an emergency overflow discharge from the AC Pond—be subject to the same effluent limits that are imposed on the treated wastewater pursuant to allowable bypass conditions under 40 CFR § 122.41(m)(2), which states:

> *Bypass not exceeding limitations.* The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation.

Therefore, the TBELs imposed at IMP 101 will be imposed on overflows from the AC Pond at Outfall 004 (see Table 6). This will help to ensure proper operation and maintenance of the treatment system and encourage Shell to prevent unnecessary discharges from the AC Pond by effectively managing its wastewater flows. DEP notes that the oil and grease limits from Outfall 001 are imposed at Outfall 004 because Outfall 004 is a final discharge location and, unlike IMP 101, there aren't any other potentially oil-bearing wastewaters that combine with Outfall 004's effluent prior to discharge.

004.B. Water Quality-Based Effluent Limitations (WQBELs)

As a facility primarily used to collect storm water, the AC Pond should not discharge at the Q_{7-10} low-flow design conditions required for WQBEL development. Any rainfall event that is sufficiently large to cause an overflow from the AC Pond also would result in increased flow in Poorhouse Run. On that basis, the discharge flow at Outfall 004 during design conditions should be zero. Shell also may direct blowdown from the cooling tower to the AC Pond for later treatment by the industrial wastewater treatment system if there are hydrocarbons present in the blowdown; however, the routing of blowdown to the AC Pond is not expected to be a normal occurrence.

004.C. Effluent Limitations and Monitoring Requirements for Outfall 004

Effluent limits applicable at Outfall 004 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements as summarized in Table 17.

Table 17. Effluent Limits and Monitoring Requirements for Outfall 004

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
BOD-5	287	766	27	72	90	40 CFR §§ 414.44 and 414.64
Total Suspended Solids	458	1,487	43	139	174	40 CFR §§ 414.44 and 414.64
Oil and Grease	—	—	15.0	—	30.0	25 Pa. Code § 92a.61(b)

Table 17 (continued). Effluent Limits and Monitoring Requirements for Outfall 004

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Acenaphthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acenaphthylene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acrylonitrile	1.03	2.59	0.096	0.242	0.302	40 CFR § 414.91
Anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Benzene	0.395	1.45	0.037	0.136	0.170	40 CFR § 414.91
Benzo(a)anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
3,4-Benzofluoranthene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Benzo(k)fluoranthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Benzo(a)pyrene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Bis(2-ethylhexyl) phthalate	1.10	2.98	0.103	0.279	0.348	40 CFR § 414.91
Carbon Tetrachloride	0.192	0.405	0.018	0.038	0.047	40 CFR § 414.91
Chlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
Chloroethane	1.11	2.86	0.104	0.268	0.335	40 CFR § 414.91
Chloroform	0.224	0.491	0.021	0.046	0.057	40 CFR § 414.91
2-Chlorophenol	0.331	1.05	0.031	0.098	0.122	40 CFR § 414.91
Chrysene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Di-n-butyl phthalate	0.288	0.608	0.027	0.057	0.071	40 CFR § 414.91
1,2-Dichlorobenzene	0.822	1.74	0.077	0.163	0.203	40 CFR § 414.91
1,3-Dichlorobenzene	0.331	0.470	0.031	0.044	0.055	40 CFR § 414.91
1,4-Dichlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
1,1-Dichloroethane	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
1,2-Dichloroethane	0.726	2.25	0.068	0.211	0.263	40 CFR § 414.91
1,1-Dichloroethylene	0.170	0.267	0.016	0.025	0.031	40 CFR § 414.91
1,2-trans-Dichloroethylene	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
2,4-Dichlorophenol	0.416	1.20	0.039	0.112	0.140	40 CFR § 414.91
1,2-Dichloropropane	1.63	2.46	0.153	0.230	0.287	40 CFR § 414.91
1,3-Dichloropropylene	0.309	0.470	0.029	0.044	0.055	40 CFR § 414.91
Diethyl phthalate	0.865	2.17	0.081	0.203	0.253	40 CFR § 414.91
2,4-Dimethylphenol	0.192	0.384	0.018	0.036	0.045	40 CFR § 414.91
Dimethyl phthalate	0.202	0.502	0.019	0.047	0.058	40 CFR § 414.91
4,6-Dinitro-o-cresol	0.833	2.96	0.078	0.277	0.346	40 CFR § 414.91
2,4-Dinitrophenol	0.758	1.31	0.071	0.123	0.153	40 CFR § 414.91
2,4-Dinitrotoluene	1.21	3.04	0.113	0.285	0.356	40 CFR § 414.91
2,6-Dinitrotoluene	2.72	6.85	0.255	0.641	0.801	40 CFR § 414.91
Ethylbenzene	0.341	1.15	0.032	0.108	0.135	40 CFR § 414.91
Fluoranthene	0.267	0.726	0.025	0.068	0.085	40 CFR § 414.91
Fluorene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Hexachlorobenzene	0.106	0.213	0.010	0.020	0.025	40 CFR § 414.91
Hexachlorobutadiene	0.213	0.523	0.020	0.049	0.061	40 CFR § 414.91
Hexachloroethane	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
Methyl Chloride	0.918	2.03	0.086	0.190	0.237	40 CFR § 414.91
Methylene Chloride	0.427	0.950	0.040	0.089	0.111	40 CFR § 414.91
Naphthalene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Nitrobenzene	0.288	0.726	0.027	0.068	0.085	40 CFR § 414.91
2-Nitrophenol	0.437	0.737	0.041	0.069	0.086	40 CFR § 414.91
4-Nitrophenol	0.769	1.32	0.072	0.124	0.155	40 CFR § 414.91
Phenanthrene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Phenol	0.160	0.277	0.015	0.026	0.032	40 CFR § 414.91
Pyrene	0.267	0.715	0.025	0.067	0.083	40 CFR § 414.91
Tetrachloroethylene	0.235	0.598	0.022	0.056	0.070	40 CFR § 414.91
Toluene	0.277	0.854	0.026	0.080	0.100	40 CFR § 414.91
1,2,4-Trichlorobenzene	11.9	29.6	0.068	0.140	0.175	40 CFR § 414.91

Table 17 (continued). Effluent Limits and Monitoring Requirements for Outfall 004

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
1,1,1-Trichloroethane	15.5	36.1	0.021	0.054	0.067	40 CFR § 414.91
1,1,2-Trichloroethane	4.49	12.8	0.021	0.054	0.067	40 CFR § 414.91
Trichloroethylene	3.42	7.37	0.021	0.054	0.067	40 CFR § 414.91
Vinyl Chloride	18.1	42.5	0.104	0.268	0.335	40 CFR § 414.91
pH	within the range of 6.0 to 9.0					40 CFR §§ 414.44 and 414.64 & 25 Pa. Code § 95.2(1)

Since discharges from Outfall 004 are rainfall-dependent and should not occur regularly, all pollutants will require 2/discharge grab sampling. Flow should be estimated concurrently.

Development of Effluent Limitations

Outfall No.	005	**Design Flow (MGD)**	0.0428
Latitude	40° 40' 50.29"	**Longitude**	-80° 19' 11.14"

Wastewater Description: Groundwater discharges from Mall Lot 2

005.A. Technology-Based Effluent Limitations (TBELs)

The drainage area for Mall Lot 2 includes a small portion of an old, closed fly ash/slag landfill. The landfill is not subject to any federal Effluent Limitations Guidelines (ELGs). There is an ELG for the Landfills Point Source Category: 40 CFR Part 445. However, pursuant to 40 CFR § 445.1(e), Part 445 does not apply to this facility. As 40 CFR § 445.1(e) states, "[Part 445] does not apply to discharges of landfill wastewater from landfills operated in conjunction with other industrial or commercial operations when the landfill only receives wastes generated by the industrial or commercial operation directly associated with the landfill". Since the landfill was not operated as a standalone facility, Part 445 is not applicable.

Combustion residual leachate is regulated under 40 CFR Part 423 – Steam Electric Power Generating Point Source Category. Part 423 does not apply to this facility according to the applicability description in 40 CFR § 423.10 because Shell's generation of electricity at the SPMS is not the principle reason for operation. Shell's power generation is used to support its manufacturing activities. Nevertheless, Part 423 can be used to guide the permitting of similar waste streams as DEP did when imposing limits on cooling tower blowdown at IMP 201. Presently, Best Available Technology limits for combustion residual leachate are vacated and under remand to EPA for reconsideration.

In the absence of applicable ELGs, site-specific TBELs were developed in accordance with 40 CFR § 125.3 based on Best Professional Judgment (BPJ). The following BPJ TBELs were imposed at this outfall in previous permits:

Table 18. BPJ TBELs for Outfall 005

Parameter	Concentration (mg/L)	
	Average Monthly	Instant. Maximum
Flow (MGD)	Report	Report
Total Suspended Solids	30.0	100.0
Cadmium, Total	0.2	0.5
Chromium, Hexavalent	0.2	0.5
Lead, Total	0.2	0.5
Selenium, Total	0.2	0.5
pH (s.u.)	6.0 (Daily Min)	9.0 (Daily Max)

Most of the effluent concentrations Shell reported at Outfall 005 are one to two orders of magnitude below current effluent limits. Earthmoving in the area of Outfall 005 has modified the characteristics of the area draining to the outfall for both groundwater and storm water. However, there is no appreciable difference in the effluent concentrations reported at Outfall 005 before and after Shell's acquisition of the site. It is not clear from the effluent data that combustion residual leachate was or is discharging at Outfall 005 because there is no obvious change in the effluent characteristics. Also, the reported effluent characteristics are not comparable to those of combustion residual leachate. The observed concentrations may indicate the negligible extent to which contaminants leach into groundwater or alternatively that there is little or no pollutant-bearing leachate from the old disposal area.

The effluent limits currently in effect at Outfall 005 will be maintained. In addition, quarterly reporting will be required for three additional parameters that are indicators of combustion residual leachate: arsenic, nitrate-nitrite as nitrogen, and mercury. Mercury reporting also is required to collect information to implement ORSANCO's prohibition on mixing zones for bioaccumulative pollutants.

005.B. Water Quality-Based Effluent Limitations (WQBELs)

Reasonable Potential Analysis and WQBEL Development for Outfall 001

Discharges from Outfall 005 are evaluated based on concentrations reported on the application. The PENTOXSD model is run with the modeled discharge and receiving stream characteristics shown in Table 19. The pollutants selected for

analysis are those identified as candidates for modeling by the Toxics Screening Analysis. Pollutants for which water quality standards have not been promulgated (e.g., TSS, oil and grease, etc.) are excluded from the modeling.

Table 19. 001 PENTOXSD Inputs

Parameter	Value
River Mile Index	953.78
Discharge Flow (MGD)	0.0428
Basin/Stream Characteristics	
Parameter	**Value**
Area in Square Miles	22,771.50
Q_{7-10} (cfs)	4,730
Low-flow yield (cfs/mi^2)	0.21
Elevation (ft)	681.95
Partial Mix Factor	0.2

A partial mix factor of 0.2 is applied by reducing the Q_{7-10} flow of the Ohio River (4,730 cfs) by 80% to 946 cfs. A PMF of 0.2 provides the permittee with 20% of the receiving stream's Q_{7-10} flow for mixing and dilution. The PMF was manually applied because PENTOXSD, as a single discharge model, allocates high percentages of stream flow to individual discharges, which often results in those discharges being modeled with most or all of a stream's assimilative capacity. This would represent a significant dilution allowance on a large waterway like the Ohio River and leave little or no assimilative capacity for other dischargers to the same receiving stream. Also, when analyzing parameters with criteria that apply at the point of potable surface water withdrawals such as Total Dissolved Solids, PENTOXSD will ignore PMFs entered in the PMF fields of the model. Therefore, the PMF was applied directly to the Q_{7-10} flow and the reduced flow was entered in the model.

Output from the PENTOXSD model run is included in Attachment C. Based on the results of the Toxics Screening Analysis, no WQBELs or water quality-based monitoring requirements apply.

005.C. Effluent Limitations and Monitoring Requirements for Outfall 005

Effluent limits applicable at Outfall 005 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements as summarized in the table below. The limits previously expressed as instantaneous maximum limits will be imposed as maximum daily limits instead. This change will make the limits consistent with the requirements of 40 CFR § 122.45(d) regarding the expression of effluent limits for continuous discharges.

Table 20. Effluent Limits and Monitoring Requirements for Outfall 005

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Quarterly	Maximum Daily	Average Quarterly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(h)
Total Suspended Solids	—	—	30.0	100.0	—	40 CFR §§ 122.44(l) & 125.3
Arsenic, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Cadmium, Total	—	—	0.2	0.5	—	40 CFR §§ 122.44(l) & 125.3
Chromium, Hexavalent	—	—	0.2	0.5	—	40 CFR §§ 122.44(l) & 125.3
Lead, Total	—	—	0.2	0.5	—	40 CFR §§ 122.44(l) & 125.3
Mercury, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Nirate-Nitrite as Nitrogen	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Selenium, Total	—	—	0.2	0.5	—	40 CFR §§ 122.44(l) & 125.3
pH	—	—	6.0 (Daily Min.)	9.0	—	40 CFR §§ 122.44(l) & 125.3

The monitoring frequencies and samples types for cadmium, chromium, lead, and selenium will remain as 2/quarter grab samples. The monitoring frequencies and samples types for arsenic, mercury, and nitrate+nitrite nitrogen will be the same. Due to the low reported effluent concentrations for TSS (the long-term average TSS concentration based on ten years of data through the Horsehead-to-Shell transition is about 7 mg/L) and the long-term compliance with pH limits, the monitoring frequencies and sample types for those parameters will be reduced from 2/month grab samples to 2/quarter grab samples. Flow monitoring will be changed to 2/quarter.

Development of Effluent Limitations

Outfall No.	011	**Design Flow (MGD)**	0.69
Latitude	40º 40' 4.00"	**Longitude**	-80º 20' 48.00"

Wastewater Description: Intake screen backwash

011.A. Technology-Based Effluent Limitations (TBELs)

The backwash water from the intake screen consists solely of water from the Ohio River. No pollutants are expected to be introduced to the effluent other than materials collected on the intake screen, which Shell is not permitted to return to the river (discussed below in Section 011.B). There are no federal ELGs applicable to discharges of intake screen backwash water and no other TBELs are developed for discharges from this outfall.

Flow monitoring is required pursuant to 25 Pa. Code § 92a.61(b).

Clean Water Act § 316(b) – Cooling Water Intake Structures ("CWIS")

On August 15, 2014, EPA promulgated Clean Water Act Section 316(b) regulations applicable to cooling water intake structures. The regulations established best technology available (BTA) standards to reduce impingement mortality and entrainment of all life stages of fish and shellfish at existing power-generating and manufacturing facilities. The Final Rule took effect on October 14, 2014. Regulations implementing the 2014 Final Rule (and the previously promulgated Phase I Rule) are provided in 40 CFR Part 125, Subparts I and J for new facilities and existing facilities, respectively. Associated NPDES permit application requirements for facilities with cooling water intake structures are provided in 40 CFR Part 122, Subpart B – Permit Application and Special NPDES Program Requirements (§ 122.21(r)).

SPMS's Cooling Water Intake Structure Characteristics and Flows

The SPMS will include a cooling water intake structure ("CWIS") on the Ohio River. The CWIS will have two partially submerged shoreline intake bays/channels. The base elevation of the intake is 670.0 feet and the normal pool elevation of the Ohio River is 682.0 feet in the Montgomery Pool, so the water depth in the intake will normally be about 12 feet with a high water depth of 38 feet and a low water depth of 8 feet. The two channels will each have the following:

- One (1) 20-foot high × 8-foot 2-inch wide bar trash racks made up of three sections of equal height with ½-inch × 2½-inch vertical stainless-steel bars spaced two inches on center yielding 1½-inch openings between bars
- One (1) 24-foot long manually operated aluminum trash rack rake
- One (1) 20-foot high × 8-foot 2-inch wide stop log gates made up of three sections of equal height; a lifting beam and equalizing valve will be provided to allow for stop log removal
- One (1) 24" pitch dual flow travel water screens with wings walls, 4-foot basket widths × 43" centers. In a dual flow system, the screens are oriented perpendicular to the direction of the intake. Influent flow is directed into both the upward and downward-moving sides of the traveling screens by wing walls. Screened flow recombines as a common effluent that leads to the intake pumps.

The existing channel openings are 9-feet 2-inches wide, but plans call for 6-inch concrete surface patches on the sides of each opening, which would make the channel openings 8-feet 2-inches wide.

The traveling screens are of fish-handling design. Each screen is provided with a high-pressure cleaning system consisting of a 102 gpm water pump (two pumps total) feeding an overlapping water spray across the entire back of the screen trays. The screens have an upper fish trough and a lower debris trough with separate discharges to convey aquatic organisms downstream of the intake structure and to convey debris/trash to a collection point for offsite disposal. The screens are made of 316 stainless steel with 0.072" diameter wire and 0.25" square openings. The design through-screen velocity will be 0.38 feet per second at normal pool elevations.

The intake will be equipped with three (3) Goulds pumps—two operating and one redundant. The pumps are each rated for 0.44 MG/hr (10.56 MGD). The Design Intake Flow ("DIF") of the CWIS is 21.12 MGD, which excludes the capacity of the redundant pump per the definition of DIF in 40 CFR § 125.92(g).[8]

[8] *Design intake flow* (DIF) means the value assigned during the cooling water intake structure design to the maximum instantaneous rate of flow of water the cooling water intake system is capable of withdrawing from a source waterbody. The facility's DIF may be adjusted to reflect permanent changes to the maximum capabilities of the cooling water intake system to withdraw cooling water, including pumps permanently removed from service, flow limit devices, and physical limitations of the piping. DIF does not include values associated with emergency and fire suppression capacity or redundant pumps (i.e., back-up pumps).

Applicability Criteria of 40 CFR Part 125, Subpart J

The SPMS is an "existing facility" as defined in 40 CFR § 125.92(k).[9] Shell is modifying the existing cooling water intake structure remaining at the site from the previous owner, Horsehead Corporation. Shell's modifications include replacement of the following: the building overlaying the intake structure, the sluice gate, the intake pumps, the bar trash racks, the traveling screens, and other related components. The concrete foundation will be repaired, but otherwise will remain intact. Despite these extensive changes, the new facility requirements under 40 CFR Part 125, Subpart I only apply to an existing modified cooling water intake structure if the DIF is increased. Shell is decreasing the DIF of the CWIS from 80 MGD to about 21 MGD, so Subpart I requirements are not applicable.

Existing facilities are subject to 40 CFR Part 125, Subpart J – Requirements Applicable to Cooling Water Intake Structures for Existing Facilities Under Section 316(b) of the Clean Water Act if they meet the applicability criteria given by § 125.91(a), as follows:

(a) The owner or operator of an existing facility, as defined in §125.92(k), is subject to the requirements at §§125.94 through 125.99 if:

(1) The facility is a point source;

(2) The facility uses or proposes to use one or more cooling water intake structures with a cumulative design intake flow (DIF) of greater than 2 million gallons per day (mgd) to withdraw water from waters of the United States; and

(3) Twenty-five percent or more of the water the facility withdraws on an actual intake flow basis is used exclusively for cooling purposes.

The SPMS is a point source and will use a cooling water intake structure with a design intake flow of about 21 MGD, which is greater than the 2 MGD threshold. Shell estimates that 87% of the water withdrawn by SPMS will be used for cooling purposes, which exceeds the 25% applicability threshold (note: actual intake flow is not available because the SPMS is not operating). Since the SPMS meets all applicability criteria, it is subject to the requirements of §§ 125.94 through 125.99.

Shell listed its chosen method of compliance with the impingement mortality standard as a closed-cycle recirculating system, which is one of the preset options to comply with BTA standards for impingement mortality under 40 CFR § 125.94(c)(1). Therefore, Shell will comply with BTA standards for impingement mortality. Since the primary method of compliance with impingement BTA standards is the use of a closed-cycle system, the facility is not required to submit an impingement technology performance optimization study.

BTA standards for entrainment are site-specific determinations per 40 CFR § 125.94(d). Based on DEP's review of information submitted with the permit application, BTA for entrainment will be operation of a closed-cycle recirculating system. Shell expects the intake to operate with a through-screen velocity of 0.38 feet per second at the Ohio River's normal pool elevation, which is less than Subpart J's recommended 0.5 fps design and actual through-screen velocity. As explained previously, the traveling screens will have fish returns. The velocity will not be accounted for as part of BTA for entrainment because velocities may exceed 0.5 fps when pool elevations are low. The fish returns are also beneficial, but will not be called-out as part of BTA for entrainment.

Shell must conduct daily monitoring of intake flows as required by 40 CFR 125.94(c)(1). The CWIS requirements imposed in the permit pursuant to Section 316(b) of the Clean Water Act and 40 CFR Part 125, Subpart J are as follows:

A. Nothing in this permit authorizes a take of endangered or threatened species under the Endangered Species Act.

B. Technology and operational measures employed at the cooling water intake structures must be operated in a way that minimizes impingement mortality and entrainment to the fullest extent possible.

[9] *Existing facility* means any facility that commenced construction as described in 40 CFR 122.29(b)(4) on or before January 17, 2002 (or July 17, 2006 for an offshore oil and gas extraction facility) and any modification of, or any addition of a unit at such a facility. A facility built adjacent to another facility would be a new facility while the original facility would remain as an existing facility for purposes of this subpart. A facility cannot both be an existing facility and a new facility as defined at §125.83.

C. The permittee shall not alter the location, design, construction or capacity of the intake structure(s) without prior approval of DEP.

D. Best Technology Available (BTA) Requirements

To meet BTA requirements to minimize adverse impacts from impingement and entrainment, the permittee shall utilize a closed-cycle recirculating cooling system. To comply with these BTA requirements the permittee shall:

1. Operate a closed cycle recirculating system as defined at 40 CFR §125.92(c).

2. Monitor the actual intake flows at a minimum frequency of daily, including measurements of cooling water withdrawals, make-up water and blow down volume or alternatively monitor cycles of concentration at a minimum frequency of daily.

3. Submit the results of monitoring in paragraph D.2 above on the Cooling Water Intake Monitoring Supplemental Report (3800-FM-BCW0010) as an attachment to monthly DMRs.

E. If DEP determines the methods to meet impingement and entrainment BTA requirements are not sufficient the permittee will employ additional controls to reduce adverse impacts from impingement and entrainment.

F. The permittee shall, on an annual basis, submit a report describing any modifications to the operation of any unit at the facility that impacts cooling water withdrawals or operation of the cooling water intake structure(s) during a calendar year. If not applicable, the permittee shall submit a statement certifying that no modifications have occurred in lieu of a report. The annual report or statement is due by January 28 of each year.

G. If the permittee wishes to submit a request for a reduction in permit application requirements as specified in 40 CFR § 125.95(c), the request must be submitted to DEP at least two years and six months before the permit expiration date.

H. The permittee shall retain data and other records for any information developed pursuant to Section 316(b) of the Clean Water Act for a minimum of ten years.

I. New Units.

The permittee must submit applicable information in 40 CFR §122.21(r) at least 180 days prior to the planned commencement of cooling water withdrawals associated with the operation of a new unit (as defined in 40 CFR §125.92(u)).

011.B. <u>Water Quality-Based Effluent Limitations (WQBELs)</u>

As stated above, other than materials that collect on intake screen, no other pollutants are expected to be introduced to Outfall 011's effluent. Therefore, no reasonable potential to cause or contribute to excursions above water quality standards is presumed to exist.

Notwithstanding a lack of reasonable potential for backwash discharges to cause or contribute to excursions above numerical water quality standards, any discharges containing debris from the intake screen would violate narrative water quality criteria and corresponding prohibitions under 25 Pa. Code §§ 93.6 and 92a.41(c), respectively, which state:

§ 93.6. General water quality criteria

(a) Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life.

(b) In addition to other substances listed within or addressed by this chapter, specific substances to be controlled include, but are not limited to, floating materials, oil, grease, scum and substances that produce color, tastes, odors, turbidity or settle to form deposits.

§ 92a.41. Conditions applicable to all permits.

(c) The discharger may not discharge floating materials, scum, sheen, or substances that result in deposits in the receiving water. Except as provided for in the permit, the discharger may not discharge foam, oil, grease, or substances that produce an observable change in the color, taste, odor or turbidity of the receiving water.

Based on those requirements, the following permit condition (in addition to the § 92a.41(c) condition cited above, which is included in all NPDES permits) applicable to Outfall 011 will be imposed in the permit to ensure compliance with narrative water quality criteria:

" Debris collected on the intake trash racks shall not be returned to the waterway."

011.C. Effluent Limitations and Monitoring Requirements for Outfall 011

There are no TBELs or WQBELs applicable to discharges from Outfalls 011. Therefore, the narrative condition regarding collected materials will be imposed along with flow monitoring.

Table 21. Effluent limits and monitoring requirements for Outfall 011

Pollutant	Mass (pounds)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(b)
Debris collected on the intake trash racks shall not be returned to the waterway.						25 Pa. Code §§ 92a.41(c) & 93.6

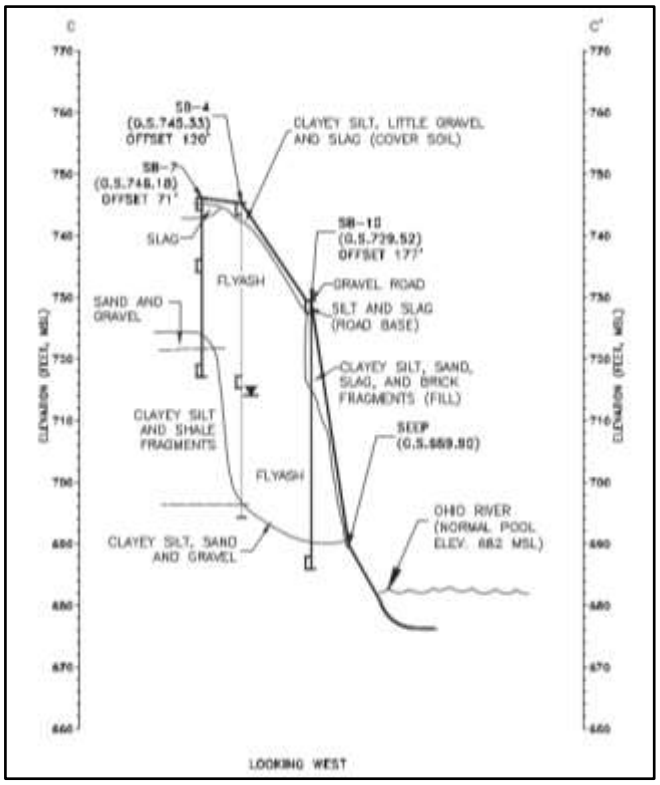
The monitoring frequency and sample type for discharge flow will remain unchanged from the previous permit: 1/week, estimates.

Development of Effluent Limitations

Outfall No. 015 **Design Flow (MGD)** Variable
Latitude 40° 40' 47.53" **Longitude** 80° 19' 19.32"
Wastewater Description: Groundwater seep

015.A. Technology-Based Effluent Limitations (TBELs)

Figure 1. Fly Ash Landfill Cross-Section [10]



The groundwater seep at Outfall 015 originates from the base on an old fly ash landfill (see Figure 1). The outfall is currently subject to TBELs based on partially vacated requirements for combustion residual leachate from 40 CFR Part 423. As part of its renewal application Shell requested that effluent limits be removed from Outfall 015 as follows:

"Shell is requesting to remove the limits for Outfall 015 [because] the water volume is low, the flow is minimal to non-existent which creates issues with obtaining representative samples, in particular Total Suspended Solids. The water flow from the seep is so low that it is difficult to collect a sample without contaminating it with sediment, therefore potentially leading to a non-compliance issue that is not representative of the water quality." Shell summarized the effluent data it collected in a table included with the application (reproduced below).

DEP generally does not consider sampling difficulties to be an appropriate reason to backslide on effluent limits. However, information that impacts one or more of the factors listed in 40 CFR § 125.3 that DEP considers when setting BPJ TBELs may support backsliding. Sections 125.3(c) and (d) require DEP to consider: the cost/benefit of applying a technology; the age of equipment and facilities involved; the processes employed; the engineering aspects of the application of various types of control techniques; process changes; non-water quality environmental impacts; and economic achievability.

Table 22. Outfall 015 Effluent Data Summary

Parameter	Average Concentration (mg/L)	Maximum Concentration (mg/L)	Number of samples
Oil and Grease	3.83	5.20	16
Total Suspended Solids	29.75	180.00	30
Total Antimony	0.01	0.01	25
Total Arsenic	0.01	0.05	25
Total Boron	4.20	6.80	25
Total Cadmium	0.003	0.02	25
Total Iron	2.24	15.00	25
Total Lead	0.01	0.04	25
Total Manganese	0.88	1.60	25
Total Mercury	0.00002	0.00002	25
Total Nickel	0.01	0.03	25
Total Selenium	0.01	0.01	25
pH (S.U.)	Min: 6.63	Max: 8.73	33

[10] Figure 3-3 from the Final Site Investigation Report Fly Ash Landfill Mall Lot #2 by Michael Baker Jr., Inc. for Pennsylvania Department of Environmental Protection. September 2013. The figure is vertically exaggerated and not to scale.

Section 125.3(c) also requires permitting authorities to consider "[t]he appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information" and "[a]ny unique factors relating to the applicant".

The current effluent limits for TSS are based on the use of settling technologies. The oil and grease limits are based on the use of gravity separation. Shell does not implement either of those technologies at Outfall 015 and has only reported effluent violations for TSS. Shell attributes those TSS violations to sampling interferences and not to the characteristics of the seepage. To the extent that such interferences exist, Shell should explain why measures taken to collect representative samples and to minimize sampling interferences are not effective; whether those measures are not effective (i.e., whether effluent data are characteristic of the seep); whether other options exist to minimize sample contamination; and whether those other options are practicable.

DEP observed that Shell constructed a small box at the seep to allow seepage flow to accumulate for sampling purposes. Overflows from that box should not result in the disturbance of sediment provided enough seepage accumulates in the box. DEP understands that the seep is in the floodplain of the Ohio River and that some interferences or access limitations are unavoidable—namely, when that area is inundated by the Ohio River during high water conditions. The quarterly sampling required by the permit should allow Shell opportunities to collect samples that avoid high water conditions.

Metals

The sampling requirements for metals were added to Outfall 015 because metals were present in historical soil and groundwater samples. Sampling of Outfall 015's discharges under the permit was intended to allow for better effluent characterization because data on the seep were limited when Outfall 015 was added to the permit. When Outfall 015 was added to the permit, Shell's effluent data did not suggest that metals were present in treatable concentrations and data collected under the permit has generally demonstrated that to be true. Table 23 compares the average effluent concentrations of Outfall 015's discharges to the average characteristics of untreated combustion residual leachate as determined by EPA.

Table 23. Comparison of Combustion Residual Leachate and Outfall 015 Effluent Characteristics

Parameter	Combustion Residual Leachate Average Total Concentration (µg/L)[11]	Shell: Average Concentration (µg/L)
Total Dissolved Solids	3,500,000	793,421
Total Suspended Solids	35,800	29,750
Total Antimony	3.75	<10
Total Arsenic	38.4	<13.7
Total Boron	22,400	4,204
Total Cadmium	10.1	<2.62
Total Iron	37,100	2,236
Total Lead	2.37	<10.4
Total Manganese	2,720	884
Total Mercury	1.06	<0.211
Total Nickel	46.5	11.8
Total Selenium	111	<9.27
Total Zinc	211	513

As the data show, Outfall 015's effluent is not comparable to combustion residual leachate.

The effluent limits for metals imposed on similar groundwater discharges at Outfall 005 are based, in part, on the use of chemical precipitation, which is a widely available and affordable technology to remove metals. A comparison of those limits to Shell's effluent data indicates that Outfall 015's untreated effluent concentrations are already a magnitude less than limits that might be imposed pursuant to the use of chemical precipitation. Also, as Shell notes, the flow rate of the seep is very low—on average about 0.000021 MGD or 0.0146 gallons per minute. Therefore, on a cost/benefit basis—

[11] Table 6-9 Average Pollutant Concentrations of Combustion Residual Leachate. pp. 6-13 to 6-14. Technical Development Document for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category. U.S. EPA. September 2015.

one of the § 125.3(d) factors for Best Practicable Technology (BPT) and Best Conventional Technology (BCT)—the use of chemical precipitation is not a reasonable basis for case-by-case TBELs. There would be little or no measurable benefit derived from the costs associated with collecting and treating the seep for metals.

Settling and chemical precipitation are economically achievable as Best Available Technologies (BAT), but the engineering aspects of those control technologies for this seep combined with the low flow rate and low pollutant concentrations do not lead DEP to recommend those technologies as BAT. The seep discharge at Outfall 015 is located in the floodplain of the Ohio River, which is not an appropriate location for engineered wastewater treatment structures like impoundments or settling tanks because they may frequently be inundated by the river, cease to function, and require extensive maintenance. Shell could install a pump to remove the seepage from the floodplain to upgradient treatment systems, but that pump also could be inundated regularly. For these reasons, no additional TBELs are developed for metals. Existing limits and monitoring requirements for metals at Outfall 015 will remain in the permit.

Regulatory Effluent Standards and Monitoring Requirements

Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(d)(1). Effluent standards for pH (6.0 minimum and 9.0 maximum) will be imposed at Outfall 015 based on 25 Pa. Code § 95.2(1).

015.B. Water Quality-Based Effluent Limitations (WQBELs)

No water quality-based effluent limits are imposed at Outfall 015. Reported effluent concentrations for most pollutants in the seep do not exceed water quality criteria. Those that do exceed water quality criteria (boron, cadmium, manganese, phenols, thallium and zinc)[12] are nonetheless present at levels much less than the WQBELs that would be considered for Outfall 015. DEP previously conducted a PENTOXSD analysis assuming a discharge flow rate of 0.1 MGD. The most stringent calculated WQBEL was 2,722 µg/L for cadmium, which is four orders of magnitude greater than the reported cadmium concentration of <2.62 µg/L. Boron had the highest reported concentration at 4,204 µg/L, but the calculated WQBEL was 10,550,000 µg/L. These results are expected given the low pollutant concentrations in the seep, the low discharge flow rate of the seep, and the significant dilution afforded by the Ohio River.

015.C. Effluent Limitations and Monitoring Requirements for Outfall 015

Effluent limits applicable at Outfall 015 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements as summarized in Table 24. There are no WQBELs, so limits are based solely on TBELs and regulatory monitoring requirements and effluent standards.

Table 24. Effluent Limits and Monitoring Requirements for Outfall 015

Pollutant	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(b)
Total Suspended Solids	—	—	30.0	100.0	—	40 CFR 122.44(l)
Oil and Grease	—	—	15.0	20.0	—	40 CFR 122.44(l)
pH	—	—	6.0 (Daily Min)	9.0	—	25 Pa. Code § 95.2(1)
Antimony, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Arsenic, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Boron, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Cadmium, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Iron, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Lead, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Manganese, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Mercury, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Nickel, Total	—	—	—	Report	—	25 Pa. Code § 92a.61

[12] Only boron and manganese were detected; the others were reported as 'less than the reporting limit', but the reporting limits used by Shell are higher than DEP's target quantitation limits.

Table 24 (continued). Effluent Limits and Monitoring Requirements for Outfall 015

Pollutant	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Instant Maximum	
Selenium, Total	—	—	—	Report	—	25 Pa. Code § 92a.61
Zinc, Total	—	—	—	Report	—	25 Pa. Code § 92a.61

The monitoring frequency for TSS, oil and grease, and pH will be set at 2/quarter using grab sampling. Metals will require 1/quarter grab sampling. Flow should be estimated at the time of sampling.

Tools and References Used to Develop Permit	
☐	WQM for Windows Model (see Attachment)
☒	PENTOXSD for Windows Model (see Attachment C)
☒	TRC Model Spreadsheet (see Attachment E)
☒	Temperature Model Spreadsheet (see Attachment D)
☒	Toxics Screening Analysis Spreadsheet (see Attachment B)
☒	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☒	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
☐	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
☐	Pennsylvania CSO Policy, 385-2000-011, 9/08.
☐	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
☐	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
☐	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
☐	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 391-2000-007, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
☒	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
☐	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
☒	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
☒	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
☐	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 10/97.
☐	Implementation Guidance for Application of Section 93.5(e) for Potable Water Supply Protection Total Dissolved Solids, Nitrite-Nitrate, Non-Priority Pollutant Phenolics and Fluorides, 391-2000-019, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 3/99.
☐	Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances, 391-2000-022, 3/1999.
☐	Design Stream Flows, 391-2000-023, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 391-2000-024, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
☐	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☐	SOP:
☐	Other:

ATTACHMENT A

Previously Authorized
TDS Discharge Loading Evaluation

TDS Evaluation – Existing Authorized TDA Load

DEP's guidance for TDS load evaluations pursuant to 25 Pa. Code Chapter 95.10 (i.e., *Policy and Procedure for NPDES Permitting of Discharges of Total Dissolved Solids (TDS) -- 25 Pa. Code §95.10*, November 12, 2011, Document No. 385-2100-002) suggests that an initial determination be made on whether a discharge's TDS concentration has a reasonable potential to exceed 2,000 mg/L. "Reasonable potential" is defined in the guidance as exceeding 1,000 mg/L of TDS on a routine basis. If Shell expected TDS concentrations in the proposed petrochemical plant's process wastewater discharges to be below 1,000 mg/L, then determining the existing authorized TDS loading would not be necessary because no reasonable potential would exist and the discharges would be exempt from Chapter 95.10 regulations.

Shell's estimated TDS discharge concentrations for the petrochemical plant's process wastewaters are 4,690 mg/L for wet weather and 7,375 mg/L for dry weather (potentially contaminated storm water will be treated as process wastewater, which is why there is an estimate for wet weather). Both of those concentrations exceed 2,000 mg/L, so it is necessary to determine existing authorized TDS loading.

The TDS guidance directs the timing of determinations on existing mass loadings to be made when there are proposed hydraulic expansions or changes in waste streams. While this generally refers to activities conducted as part of the same industrial operations under the same permit number (e.g., if Horsehead, the former owner of the site, were expanding or changing one of its waste streams), a complete change in the type of industrial activity (zinc smelting to ethane cracking), while not envisioned by the guidance, would reasonably warrant a determination of existing authorized mass loadings of TDS. DEP has transferred Horsehead's NPDES permit to Shell and is now amending that permit to authorize discharges from Shell's future petrochemical plant. The NPDES permit was transferred, in part, to maintain Horsehead's existing mass loadings of TDS for Shell's proposed petrochemical plant as opposed to assigning a new permit number to Shell that would theoretically void the authorized mass loadings of TDS associated with Horsehead's former operations.

Per the TDS guidance, existing mass loadings of TDS should be expressed as both average daily and maximum daily values to conform with the requirements of §95.10 (a)(1) and (7). The guidance establishes a preferred process for determining existing mass loadings of TDS based on what information is available. The primary reference for load determinations would be existing TDS effluent limits in an existing permit. Horsehead was not subject to TDS effluent limits, so the secondary reference is application data. Note that TDS loads based on application data are considered to be authorized even though no TDS limits were imposed; the fact that DEP did not impose TDS effluent limits does not mean that the TDS concentrations/loads reported on an application were not implicitly approved by issuing a permit based on that application.

The guidance states that, "In general, the highest representative data may be selected from the average data values and the maximum data values that are available, provided that the representative data are consistent with DEP authorizations issued prior to August 21, 2010." Those values would exclude data on cooling water and any storm water that does not come into contact with industrial materials and activities. For the purposes of establishing Horsehead's existing authorized mass loadings of TDS that would be carried over to Shell, Horsehead's cooling water is excluded from the calculation. Horsehead's storm water, however, will be included because Horsehead's storm water runoff from the site has historically been collected and treated with the facility's process wastewaters as a bearer of industrial contaminants. DEP does not have TDS data for Horsehead's storm water associated with an industrial activity independent of the combined process/storm water discharge.

The most recent application data on Horsehead's discharges is from 2006, which predates the August 21, 2010 date given in Chapter 95.10. Although DEP has not issued a permit based on the 2006 application that would have implicitly approved the TDS mass loads contained in the 2006 application, the 2006 data are the most current available and are considered to be representative of Horsehead's operations prior to August 21, 2010. Additionally, Horsehead's operations have ceased, so sampling Horsehead's discharges to collect data that would be representative of pre-August 21, 2010 operations is no longer an option.

TDS data and flow data from Horsehead's 2006 application are summarized below.

Outfall No.	Type of Discharge	Module 3		Module 4			
		Discharge Rate		Max Daily Value		Avg. of Analysis	
		Max Flow *MGD*	Avg. Flow *MGD*	TDS *mg/L*	TDS *lb/day*	TDS *mg/L*	TDS *lb/day*
002	Sewage Treatment Plant	0.397	0.104	347	624.6	NA	NA
003	Once through cooling	90	66	136	74,859.8	NA	NA
004	Flyash settling and deioinzer backwash	**1.0**	0.5	**450**	810.65	**416**	749.39
010	Stormwater and sampling condensate	0.0072	0.0072	120	1,859.8	NA	NA
001	Process, stormwater and NCCW	8.39	4.99	NA	NA	NA	NA
101	Process and stormwater (60 ac.)	**1.11**	0.50	**7,500**	39,281.4	**6,706.7**	37,139.9
201	NCCW	5.14	4.42	451	18,981.8	NA	NA
007	Stormwater (11 ac.)	NA	No Flow	NA	NA	NA	NA
008	Stormwater (14 ac.)	NA	0.022	NA	NA	NA	NA
009	Stormwater (34 ac.)	NA	No Flow	NA	NA	NA	NA

Outfalls 002, 003, 007, 008, 009 and 010 and Internal Monitoring Point 201 are excluded from the existing mass loading calculation. Outfall 003 and IMP 201 discharged cooling water, which is excluded from Chapter 95.10 regulations. Outfalls 007, 008 and 009 were overflows from storm water collection basins. Storm water from those basins was normally pumped to Horsehead's industrial wastewater treatment plant. Overflows from the basins occurred infrequently and did not represent a consistent contribution to Horsehead's TDS discharge loading as shown by the lack of data in the table. Outfall 010 contained a mix of potable water, boiler water/steam and storm water runoff. Although some part of Outfall 010's discharges would potentially be considered as part of the existing mass loading of TDS, there is no flow differentiation between the sources; also, although maximum TDS concentrations were reported for Outfall 010, there are no corresponding average values. Similarly, average TDS loads from Outfall 002 were not provided. Therefore, the available dataset for Outfalls 002 and 010 are considered to be insufficient to include those contributions (recall that DEP must develop both maximum daily and average daily values).

Existing mass loadings of TDS will be based on Outfall 004 and IMP 101 (values in red on the table). The maximum flows reported on Module 3 will be used with the maximum and average TDS concentrations reported on Module 4 (i.e., the "highest representative data" selected from the average data values and the maximum data values). These calculations are summarized below:

Loading (lb/day) = Flow (MGD) × Concentration (mg/L) × 8.34 (8.34 is a conversion factor)

Average Daily Loading

$8.34 \times (Qmax_{004}Cavg_{004} + Qmax_{101}Cavg_{101})$
8.34 × [(1.0 MGD)(416 mg/L) + (1.11 MGD)(6,706.7 mg/L)] = **65,556 lb/day**

Maximum Daily Loading

$8.34 \times (Qmax_{004}Cmax_{004} + Qmax_{101}Cmax_{101})$
8.34 × [(1.0 MGD)(450 mg/L) + (1.11 MGD)(7,500 mg/L)] = **73,184 lb/day**

Conclusions and Recommendations

Shell's estimated maximum TDS loading reported on the amendment application is 50,078 lb/day based on a discharge of 1.28 MGD at a TDS concentration of 4,690 mg/L (for wet weather assuming treatment of contaminated storm water). The dry weather TDS loading is less than 50,078 lb/day. Since the estimated, facility-wide TDS loading for discharges from Shell's petrochemical plant is less than the previously authorized TDS discharge loading, the facility is not subject to the TDS effluent standards of § 95.10(c) pursuant to §§ 95.10(a)(1) and (7). The previously authorized monthly average and daily maximum TDS discharge loads will be included in the amended permit to assist with any potential future evaluations of TDS loading from the facility.

ATTACHMENT B

Toxics Screening Analyses

TOXICS SCREENING ANALYSIS – OUTFALL 001
WATER QUALITY POLLUTANTS OF CONCERN
VERSION 2.7

Facility: **Shell Chemical Appalachia** NPDES Permit No.: **PA0002208** Outfall: **001**

Analysis Hardness (mg/L): **100** Discharge Flow (MGD): **3.75** Analysis pH (SU): **7**

Stream Flow, Q_{7-10} (cfs): **4730**

Parameter	Maximum Concentration in Application or DMRs (µg/L)		Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Pollutant Group 1						
Total Dissolved Solids		3317000	500000	Yes	408170000	Monitor
Chloride		313000	250000	Yes	204080000	Monitor
Bromide			N/A			Monitor
Sulfate		812000	250000	Yes	204080000	Monitor
Fluoride		1100	2000	No		
Pollutant Group 2 – Metals						
Total Aluminum		4873	750	Yes	26556.23	Monitor
Total Antimony	<		5.6			
Total Arsenic	<		10			
Total Barium	<		2400			
Total Beryllium	<		N/A			
Total Boron	<		1600			
Total Cadmium	<		0.271			
Total Chromium (III)		139	N/A	No		
Hexavalent Chromium		139	10.4	Yes	576.917	Monitor
Total Cobalt	<		19			
Total Copper		55.6	9.3	Yes	478.148	Monitor
Total Cyanide		55.6	N/A	No		
Total Iron		7577	1500	Yes	1220000	No Limits/Monitoring
Dissolved Iron	<		300			
Total Lead	<		3.2			
Total Manganese		139	1000	No	164068.3	
Total Mercury	<		0.05			
Total Molybdenum	<		N/A			
Total Nickel		13.9	52.2	No		

Parameter	Maximum Concentration in Application or DMRs (µg/L)		Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Total Phenols (Phenolics)		24.5	5	Yes	4081.708	No Limits/Monitoring
Total Selenium	<		5.0			
Total Silver	<		3.8			
Total Thallium	<		0.24			
Total Zinc	<		119.8			
Pollutant Group 3 – Volatiles						
Acrolein	<		3			
Acrylamide	<		0.07			
Acrylonitrile	<		0.051			
Benzene		123	1.2	Yes	501.819	Monitor
Bromoform	<		4.3			
Carbon Tetrachloride	<		0.23			
Chlorobenzene	<		130			
Chlorodibromomethane	<		0.4			
Chloroethane	<		N/A			
2-Chloroethyl Vinyl Ether	<		3500			
Chloroform	<		5.7			
Dichlorobromomethane	<		0.55			
1,1-Dichloroethane	<		N/A			
1,2-Dichloroethane	<		0.38			
1,1-Dichloroethylene	<		33			
1,2-Dichloropropane	<		2200			
1,3-Dichloropropylene	<		0.34			
Ethylbenzene		49	530	No	86956.2	
Methyl Bromide	<		47			
Methyl Chloride	<		5500			
Methylene Chloride	<		4.6			
1,1,2,2-Tetrachloroethane	<		0.17			
Tetrachloroethylene	<		0.69			
Toluene		61	330	No	54142.54	
1,2-trans-Dichloroethylene	<		140			
1,1,1-Trichloroethane	<		610			
1,1,2-Trichloroethane	<		0.59			
Trichloroethylene	<		2.5			
Vinyl Chloride	<		0.025			

Parameter	Maximum Concentration in Application or DMRs (µg/L)		Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Pollutant Group 4 – Acid Compounds						
2-Chlorophenol	<		81			
2,4-Dichlorophenol	<		77			
2,4-Dimethylphenol	<		130			
4,6-Dinitro-o-Cresol	<		13			
2,4-Dinitrophenol	<		69			
2-Nitrophenol	<		1600			
4-Nitrophenol	<		470			
p-Chloro-m-Cresol	<		30			
Pentachlorophenol	<		0.27			
Phenol	<		10400			
2,4,6-Trichlorophenol	<		1.4			
Pollutant Group 5 – Base Compounds						
Acenaphthene		49	17	Yes	2789.161	No Limits/Monitoring
Acenaphthylene		49	N/A	No		
Anthracene		49	8300	No	1360000	
Benzidine	<		0.000086			
Benzo(a)Anthracene	<	2.5	0.0038	No (Value < QL)		
Benzo(a)Pyrene	<	2.5	0.0038	No (Value < QL)		
3,4-Benzofluoranthene	<	2.5	0.0038	No (Value < QL)		
Benzo(ghi)Perylene	<		N/A			
Benzo(k)Fluoranthene	<		0.0038			
Bis(2-Chloroethoxy)Methane	<		N/A			
Bis(2-Chloroethyl)Ether	<		0.03			
Bis(2-Chloroisopropyl)Ether	<		1400			
Bis(2-Ethylhexyl)Phthalate	<		1.2			
4-Bromophenyl Phenyl Ether	<		54			
Butyl Benzyl Phthalate	<		35			
2-Chloronaphthalene	<		1000			
4-Chlorophenyl Phenyl Ether	<		N/A			
Chrysene	<		0.0038			
Dibenzo(a,h)Anthrancene	<		0.0038			
1,2-Dichlorobenzene	<		160			
1,3-Dichlorobenzene	<		69			
1,4-Dichlorobenzene	<		150			

Parameter	Maximum Concentration in Application or DMRs (µg/L)		Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
3,3-Dichlorobenzidine	<		0.021			
Diethyl Phthalate	<		800			
Dimethyl Phthalate	<		500			
Di-n-Butyl Phthalate	<		21			
2,4-Dinitrotoluene	<		0.05			
2,6-Dinitrotoluene	<		0.05			
1,4-Dioxane	<		N/A			
Di-n-Octyl Phthalate	<		N/A			
1,2-Diphenylhydrazine	<		0.036			
Fluoranthene	<		40			
Fluorene		49	1100	No	180475.1	
Hexachlorobenzene	<		0.00028			
Hexachlorobutadiene	<		0.44			
Hexachlorocyclopentadiene	<		1			
Hexachloroethane	<		1.4			
Indeno(1,2,3-cd)Pyrene	<		0.0038			
Isophorone	<		35			
Naphthalene	<		43			
Nitrobenzene	<		17			
n-Nitrosodimethylamine	<		0.00069			
n-Nitrosodi-n-Propylamine	<		0.005			
n-Nitrosodiphenylamine	<		3.3			
Phenanthrene	<		1			
Pyrene	<		830			
1,2,4-Trichlorobenzene	<		26			

TOXICS SCREENING ANALYSIS – OUTFALL 005
WATER QUALITY POLLUTANTS OF CONCERN
VERSION 2.7

Facility: **Shell Polymers Monaca Site** NPDES Permit No.: **PA0002208** Outfall: **005**

Analysis Hardness (mg/L): **100** Discharge Flow (MGD): **0.0428** Analysis pH (SU): **7**

Stream Flow, Q_{7-10} (cfs): **4730**

Parameter	Maximum Concentration in Application or DMRs (µg/L)		Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Pollutant Group 1						
Total Dissolved Solids		540000	500000	Yes	7144260000	No Limits/Monitoring
Chloride		143000	250000	No		
Bromide	<	52	N/A	No		
Sulfate		167000	250000	No		
Fluoride		220	2000	No		
Pollutant Group 2 – Metals						
Total Aluminum		94	750	No		
Total Antimony		4.5	5.6	No		
Total Arsenic	<	6.4	10	No		
Total Barium		86	2400	No		
Total Beryllium	<	0.35	N/A	No		
Total Boron		210	1600	No		
Total Cadmium		11	0.271	Yes	3809.357	No Limits/Monitoring
Total Chromium (III)		0.71	N/A	No		
Hexavalent Chromium	<	3.6	10.4	No		
Total Cobalt		0.54	19	No		
Total Copper		21	9.3	Yes	41800.64	No Limits/Monitoring
Total Cyanide	<	4.4	N/A	No		
Total Iron		190	1500	No		
Dissolved Iron		160	300	No		
Total Lead	<	2.8	3.2	No		
Total Manganese		61	1000	No		
Total Mercury	<	0.13	0.05	No (Value < QL)		
Total Molybdenum	<	3.3	N/A	No		
Total Nickel		68	52.2	Yes	732703.1	No Limits/Monitoring

Parameter	Maximum Concentration in Application or DMRs (µg/L)		Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Total Phenols (Phenolics)		11	5	Yes	71442.63	No Limits/Monitoring
Total Selenium		5.5	5.0	Yes	71287.66	No Limits/Monitoring
Total Silver	<	0.83	3.8	No		
Total Thallium	<	3.8	0.24	Yes	3429.246	No Limits/Monitoring
Total Zinc		2500	119.8	Yes	358453.1	No Limits/Monitoring

ATTACHMENT C

PENTOXSD Modeling Results

Outfall 001

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
32317	952.70	681.85	22771.80	0.00010	0.00	☑

Stream Data

	LFY	Trib Flow	Stream Flow	WD Ratio	Rch Width	Rch Depth	Rch Velocity	Rch Trav Time	Tributary Hard	Tributary pH	Stream Hard	Stream pH	Analysis Hard	Analysis pH
	(cfsm)	(cfs)	(cfs)		(ft)	(ft)	(fps)	(days)	(mg/L)		(mg/L)		(mg/L)	
Q7-10	0.21	0	4730	0	1200	15	0	0	98	7.33	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
Outfall 001	'A0002208-1	3.75	0	0	0	0	0.2	0.2	0.2	1.3	6

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
ACENAPHTHENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
ALUMINUM	1E+07	0	0.5	0.5	0	0	0	0	1	0
ANTHRACENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
BENZENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	5E+08	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, III	1E+07	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, VI	1E+07	0	0.5	0.5	0	0	0	0	1	0
COPPER	1E+07	0	0.5	0.5	0	0	0	0	1	0
CYANIDE, FREE	1E+07	0	0.5	0.5	0	0	0	0	1	0
ETHYLBENZENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
FLUORENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
FLUORIDE (PWS)	1E+07	0	0.5	0.5	0	0	0	0	1	0
MANGANESE	1E+07	0	0.5	0.5	0	0	0	0	1	0
PHENOLICS (PWS)	1E+07	0	0.5	0.5	0	0	0	0	1	0
SULFATE (PWS)	5E+08	0	0.5	0.5	0	0	0	0	1	0
TOLUENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	5E+08	0	0.5	0.5	0	0	0	0	1	0
TOTAL IRON	1E+07	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
32317	951.71	681.67	22772.85	0.00010	216.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.21	0	4730	0	1200	15	0	0	98	7.33	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
		0	0	0	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
ACENAPHTHENE	0	0	0.5	0.5	0	0	0	0	1	0
ALUMINUM	0	0	0.5	0.5	0	0	0	0	1	0
ANTHRACENE	0	0	0.5	0.5	0	0	0	0	1	0
BENZENE	0	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, III	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, VI	0	0	0.5	0.5	0	0	0	0	1	0
COPPER	0	0	0.5	0.5	0	0	0	0	1	0
CYANIDE, FREE	0	0	0.5	0.5	0	0	0	0	1	0
ETHYLBENZENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
MANGANESE	0	0	0.5	0.5	0	0	0	0	1	0
PHENOLICS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
SULFATE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
TOLUENE	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL IRON	0	0	0.5	0.5	0	0	0	0	1	0

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
20E	32317	OHIO RIVER

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope	Depth (ft)	Width (ft)	WD Ratio	Velocity (fps)	Reach Trav Time (days)	CMT (min)
Q7-10 Hydrodynamics											
952.700	4730	0	4730	5.80124	0.0001	15	1200	80	0.2631	0.2299	1000+
951.710	4730	334.15	4395.8	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
952.700	12101	0	12101	5.80124	0.0001	22.67	1200	52.934	0.4450	0.1359	1000+
951.710	12101	334.15	11767	NA	0	0	0	0	0	0	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
952.70	**Outfall 001**	**PA0002208-1a**

AFC

Q7-10: **CCT (min)** 15 **PMF** 0.066 **Analysis pH** 7.193 **Analysis Hardness** 96.249

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	552.202	1747.475	96535.16
	Dissolved WQC. Chemical translator of 0.316 applied.						
CHROMIUM, VI	0	0	0	0	16	16.293	900.084
	Dissolved WQC. Chemical translator of 0.982 applied.						
COPPER	0	0	0	0	12.964	13.504	745.988
	Dissolved WQC. Chemical translator of 0.96 applied.						
CYANIDE, FREE	0	0	0	0	22	22	1215.338
PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
BENZENE	0	0	0	0	640	640	35355.3
ETHYLBENZENE	0	0	0	0	2900	2900	160203.7
TOLUENE	0	0	0	0	1700	1700	93912.51
ACENAPHTHENE	0	0	0	0	83	83	4585.14
ANTHRACENE	0	0	0	0	NA	NA	NA
FLUORENE	0	0	0	0	NA	NA	NA
ALUMINUM	0	0	0	0	750	750	41431.99
CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
FLUORIDE (PWS)	0	0	0	0	NA	NA	NA
TOTAL IRON	0	0	0	0	NA	NA	NA
MANGANESE	0	0	0	0	NA	NA	NA
SULFATE (PWS)	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

CFC

Q7-10: **CCT (min)** 720 **PMF** 0.2 **Analysis pH** 7.279 **Analysis Hardness** 97.41

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
952.70	**Outfall 001**	**PA0002208-1a**

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	72.539	84.348	13838.79
	Dissolved WQC. Chemical translator of 0.86 applied.						
CHROMIUM, VI	0	0	0	0	10	10.395	1705.492
	Dissolved WQC. Chemical translator of 0.962 applied.						
COPPER	0	0	0	0	8.757	9.122	1496.647
	Dissolved WQC. Chemical translator of 0.96 applied.						
CYANIDE, FREE	0	0	0	0	5.2	5.2	853.155
PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
BENZENE	0	0	0	0	130	130	21328.88
ETHYLBENZENE	0	0	0	0	580	580	95159.62
TOLUENE	0	0	0	0	330	330	54142.54
ACENAPHTHENE	0	0	0	0	17	17	2789.161
ANTHRACENE	0	0	0	0	NA	NA	NA
FLUORENE	0	0	0	0	NA	NA	NA
ALUMINUM	0	0	0	0	NA	NA	NA
CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
FLUORIDE (PWS)	0	0	0	0	NA	NA	NA
TOTAL IRON	0	0	0	0	1500	1500	1220000
	WQC = 30 day average. PMF = 1.						
MANGANESE	0	0	0	0	NA	NA	NA
SULFATE (PWS)	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

THH

Q7-10: **CCT (min)** 720 **PMF** 0.2 **Analysis pH** NA **Analysis Hardness** NA

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
952.70	**Outfall 001**	**PA0002208-1a**

CHROMIUM, VI	0	0	0	0	NA	NA	NA	
COPPER	0	0	0	0	NA	NA	NA	
CYANIDE, FREE	0	0	0	0	140	140	22969.56	
	CCT based on PWS at RMI 951.71.							
PHENOLICS (PWS)	0	0	0	0	5	5	4081.708	
	CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.							
BENZENE	0	0	0	0	NA	NA	NA	
ETHYLBENZENE	0	0	0	0	530	530	86956.2	
	CCT based on PWS at RMI 951.71.							
TOLUENE	0	0	0	0	1300	1300	213288.8	
	CCT based on PWS at RMI 951.71.							
ACENAPHTHENE	0	0	0	0	670	670	109925.8	
	CCT based on PWS at RMI 951.71.							
ANTHRACENE	0	0	0	0	8300	8300	1360000	
	CCT based on PWS at RMI 951.71.							
FLUORENE	0	0	0	0	1100	1100	180475.1	
	CCT based on PWS at RMI 951.71.							
ALUMINUM	0	0	0	0	NA	NA	NA	
CHLORIDE (PWS)	0	0	0	0	250000	250000	2.0408E+08	
	CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.							
FLUORIDE (PWS)	0	0	0	0	2000	2000	1630000	
	CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.							
TOTAL IRON	0	0	0	0	NA	NA	NA	
MANGANESE	0	0	0	0	1000	1000	164068.3	
	CCT based on PWS at RMI 951.71.							
SULFATE (PWS)	0	0	0	0	250000	250000	2.0408E+08	
	CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.							
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	500000	500000	4.0817E+08	
	CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.							

CRL

Qh: **CCT (min)** 720 **PMF** 0.2

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number						
952.70	**Outfall 001**	**PA0002208-1a**						
	CHROMIUM, VI	0	0	0	0	NA	NA	NA
	COPPER	0	0	0	0	NA	NA	NA
	CYANIDE, FREE	0	0	0	0	NA	NA	NA
	PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
	BENZENE	0	0	0	0	1.2	1.2	501.819
	ETHYLBENZENE	0	0	0	0	NA	NA	NA
	TOLUENE	0	0	0	0	NA	NA	NA
	ACENAPHTHENE	0	0	0	0	NA	NA	NA
	ANTHRACENE	0	0	0	0	NA	NA	NA
	FLUORENE	0	0	0	0	NA	NA	NA
	ALUMINUM	0	0	0	0	NA	NA	NA
	CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
	FLUORIDE (PWS)	0	0	0	0	NA	NA	NA
	TOTAL IRON	0	0	0	0	NA	NA	NA
	MANGANESE	0	0	0	0	NA	NA	NA
	SULFATE (PWS)	0	0	0	0	NA	NA	NA
	TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
20E	32317	OHIO RIVER

RMI	Name	Permit Number	Disc Flow (mgd)
952.70	Outfall 001	PA0002208-1a	3.7500

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
ACENAPHTHENE	2789.161	CFC	4351.54	2789.161	CFC
ALUMINUM	26556.23	AFC	41431.99	26556.23	AFC
ANTHRACENE	1360000	THH	2120000	1360000	THH
BENZENE	501.819	CRL	782.918	501.819	CRL
CHLORIDE (PWS)	!.0408E+08	THH	3.184E+08	2.0408E+08	THH
CHROMIUM, III	13838.79	CFC	21590.74	13838.79	CFC
CHROMIUM, VI	576.917	AFC	900.084	576.917	AFC
COPPER	478.148	AFC	745.988	478.148	AFC
CYANIDE, FREE	778.983	AFC	1215.338	778.983	AFC
ETHYLBENZENE	86956.2	THH	135665.7	86956.2	THH
FLUORENE	180475.1	THH	281570.2	180475.1	THH
FLUORIDE (PWS)	1630000	THH	2540000	1630000	THH
MANGANESE	164068.3	THH	255972.9	164068.3	THH
PHENOLICS (PWS)	4081.708	THH	6368.12	4081.708	THH
SULFATE (PWS)	!.0408E+08	THH	3.184E+08	2.0408E+08	THH
TOLUENE	54142.54	CFC	84471.06	54142.54	CFC
TOTAL DISSOLVED SOLIDS (PWS	.0817E+08	THH	6.3681E+08	4.0817E+08	THH
TOTAL IRON	1220000	CFC	1910000	1220000	CFC

Outfall 005

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
32317	953.78	681.95	22771.50	0.00010	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.21	0	946	0	240	15	0	0	98	7.33	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
Outfall 005	PA0002208-2	0.0428	0	0	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
1,1,2,2-TETRACHLOROETHANE	0	0	0.5	0.5	0	0	0	0	1	0
1,1,2-TRICHLOROETHANE	0	0	0.5	0.5	0	0	0	0	1	0
1,2-DICHLOROETHANE	0	0	0.5	0.5	0	0	0	0	1	0
1,3-DICHLOROPROPYLENE	0	0	0.5	0.5	0	0	0	0	1	0
3,4-BENZOFLUORANTHENE	0	0	0.5	0.5	0	0	0	0	1	0
ACENAPHTHENE	0	0	0.5	0.5	0	0	0	0	1	0
ACROLEIN	0	0	0.5	0.5	0	0	0	0	1	0
ACRYLONITRILE	0	0	0.5	0.5	0	0	0	0	1	0
ALUMINUM	0	0	0.5	0.5	0	0	0	0	1	0
ANTHRACENE	0	0	0.5	0.5	0	0	0	0	1	0
ANTIMONY	0	0	0.5	0.5	0	0	0	0	1	0
ARSENIC	0	0	0.5	0.5	0	0	0	0	1	0
BENZENE	0	0	0.5	0.5	0	0	0	0	1	0
BENZO(a)ANTHRACENE	0	0	0.5	0.5	0	0	0	0	1	0
BENZO(a)PYRENE	0	0	0.5	0.5	0	0	0	0	1	0
BORON	0	0	0.5	0.5	0	0	0	0	1	0
CADMIUM	1000000	0	0.5	0.5	0	0	0	0	1	0
CARBON TETRACHLORIDE	0	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
CHLORODIBROMOMETHANE	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, III	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, VI	0	0	0.5	0.5	0	0	0	0	1	0
COBALT	0	0	0.5	0.5	0	0	0	0	1	0
COPPER	1000000	0	0.5	0.5	0	0	0	0	1	0
CYANIDE, FREE	0	0	0.5	0.5	0	0	0	0	1	0
DICHLOROBROMOMETHANE	0	0	0.5	0.5	0	0	0	0	1	0

DISSOLVED IRON	0	0	0.5	0.5	0	0	0	0	1	0
ETHYLBENZENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
LEAD	0	0	0.5	0.5	0	0	0	0	1	0
MANGANESE	0	0	0.5	0.5	0	0	0	0	1	0
Mercury (ORSANCO)	0	0	0.5	0.5	0	0	0	0	1	0
NICKEL	1000000	0	0.5	0.5	0	0	0	0	1	0
PHENOLICS (PWS)	1000000	0	0.5	0.5	0	0	0	0	1	0
SELENIUM	1000000	0	0.5	0.5	0	0	0	0	1	0
SILVER	0	0	0.5	0.5	0	0	0	0	1	0
SULFATE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
TETRACHLOROETHYLENE	0	0	0.5	0.5	0	0	0	0	1	0
THALLIUM	1000000	0	0.5	0.5	0	0	0	0	1	0
TOLUENE	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	1000000	0	0.5	0.5	0	0	0	0	1	0
TOTAL IRON	0	0	0.5	0.5	0	0	0	0	1	0
TRICHLOROETHYLENE	0	0	0.5	0.5	0	0	0	0	1	0
ZINC	1000000	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
32317	951.71	681.67	22772.85	0.00010	216.00	☑

Stream Data

	LFY	Trib Flow	Stream Flow	WD Ratio	Rch Width	Rch Depth	Rch Velocity	Rch Trav Time	Tributary Hard	Tributary pH	Stream Hard	Stream pH	Analysis Hard	Analysis pH
	(cfsm)	(cfs)	(cfs)		(ft)	(ft)	(fps)	(days)	(mg/L)		(mg/L)		(mg/L)	
Q7-10	0.21	0	946	0	240	15	0	0	98	7.33	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow	Permitted Disc Flow	Design Disc Flow	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard	Disc pH
		(mgd)	(mgd)	(mgd)						(mg/L)	
		0	0	0	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
1,1,2,2-TETRACHLOROETHANE	0	0	0.5	0.5	0	0	0	0	1	0
1,1,2-TRICHLOROETHANE	0	0	0.5	0.5	0	0	0	0	1	0
1,2-DICHLOROETHANE	0	0	0.5	0.5	0	0	0	0	1	0
1,3-DICHLOROPROPYLENE	0	0	0.5	0.5	0	0	0	0	1	0
3,4-BENZOFLUORANTHENE	0	0	0.5	0.5	0	0	0	0	1	0
ACENAPHTHENE	0	0	0.5	0.5	0	0	0	0	1	0
ACROLEIN	0	0	0.5	0.5	0	0	0	0	1	0
ACRYLONITRILE	0	0	0.5	0.5	0	0	0	0	1	0
ALUMINUM	0	0	0.5	0.5	0	0	0	0	1	0
ANTHRACENE	0	0	0.5	0.5	0	0	0	0	1	0
ANTIMONY	0	0	0.5	0.5	0	0	0	0	1	0
ARSENIC	0	0	0.5	0.5	0	0	0	0	1	0
BENZENE	0	0	0.5	0.5	0	0	0	0	1	0
BENZO(a)ANTHRACENE	0	0	0.5	0.5	0	0	0	0	1	0
BENZO(a)PYRENE	0	0	0.5	0.5	0	0	0	0	1	0
BORON	0	0	0.5	0.5	0	0	0	0	1	0
CADMIUM	0	0	0.5	0.5	0	0	0	0	1	0
CARBON TETRACHLORIDE	0	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
CHLORODIBROMOMETHANE	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, III	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, VI	0	0	0.5	0.5	0	0	0	0	1	0
COBALT	0	0	0.5	0.5	0	0	0	0	1	0
COPPER	0	0	0.5	0.5	0	0	0	0	1	0
CYANIDE, FREE	0	0	0.5	0.5	0	0	0	0	1	0
DICHLOROBROMOMETHANE	0	0	0.5	0.5	0	0	0	0	1	0
DISSOLVED IRON	0	0	0.5	0.5	0	0	0	0	1	0
ETHYLBENZENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0

LEAD	0	0	0.5	0.5	0	0	0	0	1	0
MANGANESE	0	0	0.5	0.5	0	0	0	0	1	0
Mercury (ORSANCO)	0	0	0.5	0.5	0	0	0	0	1	0
NICKEL	0	0	0.5	0.5	0	0	0	0	1	0
PHENOLICS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
SELENIUM	0	0	0.5	0.5	0	0	0	0	1	0
SILVER	0	0	0.5	0.5	0	0	0	0	1	0
SULFATE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
TETRACHLOROETHYLENE	0	0	0.5	0.5	0	0	0	0	1	0
THALLIUM	0	0	0.5	0.5	0	0	0	0	1	0
TOLUENE	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL IRON	0	0	0.5	0.5	0	0	0	0	1	0
TRICHLOROETHYLENE	0	0	0.5	0.5	0	0	0	0	1	0
ZINC	0	0	0.5	0.5	0	0	0	0	1	0

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
20E	32317	OHIO RIVER

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope	Depth (ft)	Width (ft)	WD Ratio	Velocity (fps)	Reach Trav Time (days)	CMT (min)
Q7-10 Hydrodynamics											
953.780	946	0	946	0.06621	0.0001	15	240	16	0.2628	0.4814	135.879
951.710	946	334.15	611.85	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
953.780	2964.3	0	2964.3	0.06621	0.0001	24.793	240	9.6800	0.4982	0.2539	63.948
951.710	2964.3	334.15	2630.1	NA	0	0	0	0	0	0	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
953.78	**Outfall 005**	**PA0002208-2**

AFC

Q7-10: **CCT (min)** 15 **PMF** 0.332 **Analysis pH** 7.329 **Analysis Hardness** 98

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CADMIUM	0	0	0	0	1.975	2.09	9922.674
	Dissolved WQC. Chemical translator of 0.945 applied.						
COPPER	0	0	0	0	13.186	13.735	65215.71
	Dissolved WQC. Chemical translator of 0.96 applied.						
NICKEL	0	0	0	0	460.303	461.225	2180000
	Dissolved WQC. Chemical translator of 0.998 applied.						
SELENIUM	0	0	0	0	NA	NA	NA
THALLIUM	0	0	0	0	65	65	308625.1
ZINC	0	0	0	0	115.192	117.783	559244.4
	Dissolved WQC. Chemical translator of 0.978 applied.						
PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

CFC

Q7-10: **CCT (min)** 135.879 **PMF** 1 **Analysis pH** 7.329 **Analysis Hardness** 98

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CADMIUM	0	0	0	0	0.243	0.267	3809.357
	Dissolved WQC. Chemical translator of 0.91 applied.						
COPPER	0	0	0	0	8.802	9.169	131015.1
	Dissolved WQC. Chemical translator of 0.96 applied.						
NICKEL	0	0	0	0	51.125	51.279	732703.1
	Dissolved WQC. Chemical translator of 0.997 applied.						
SELENIUM	0	0	0	0	4.6	4.989	71287.66
	Dissolved WQC. Chemical translator of 0.922 applied.						
THALLIUM	0	0	0	0	13	13	185750.8
ZINC	0	0	0	0	116.134	117.783	1680000
	Dissolved WQC. Chemical translator of 0.986 applied.						
PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

THH

Q7-10: **CCT (min)** 135.879 **PMF** NA **Analysis pH** NA **Analysis Hardness** NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
953.78	**Outfall 005**	**PA0002208-2**

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CADMIUM	0	0	0	0	NA	NA	NA
COPPER	0	0	0	0	NA	NA	NA
NICKEL	0	0	0	0	610	610	8710000
SELENIUM	0	0	0	0	NA	NA	NA
THALLIUM	0	0	0	0	0.24	0.24	3429.246
ZINC	0	0	0	0	NA	NA	NA
PHENOLICS (PWS)	0	0	0	0	5	5	71442.63
	WQC applied at RMI 951.71 with a design stream flow of 946.						
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	500000	500000	7.14426E+09
	WQC applied at RMI 951.71 with a design stream flow of 946.						

CRL

Qh: **CCT (min)** 63.948 **PMF** 1

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CADMIUM	0	0	0	0	NA	NA	NA
COPPER	0	0	0	0	NA	NA	NA
NICKEL	0	0	0	0	NA	NA	NA
SELENIUM	0	0	0	0	NA	NA	NA
THALLIUM	0	0	0	0	NA	NA	NA
ZINC	0	0	0	0	NA	NA	NA
PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
20E	32317	OHIO RIVER

RMI	Name	Permit Number	Disc Flow (mgd)
953.78	Outfall 005	PA0002208-2	0.0428

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
CADMIUM	3809.357	CFC	5943.209	3809.357	CFC
COPPER	41800.64	AFC	65215.71	41800.64	AFC
NICKEL	732703.1	CFC	1140000	732703.1	CFC
PHENOLICS (PWS)	71442.63	THH	111462	71442.63	THH
SELENIUM	71287.66	CFC	111220.2	71287.66	CFC
THALLIUM	3429.246	THH	5350.175	3429.246	THH
TOTAL DISSOLVED SOLIDS (PWS	1000000	INPUT	1560000	7.14426E+09	THH
ZINC	358453.1	AFC	559244.4	358453.1	AFC

ATTACHMENT D

Temperature Modeling Results for Outfall 001

Facility: **Shell Polymers Monaca Site**
Permit Number: PA0002208 **PMF**
Stream Name: Ohio River 0.200
Analyst/Engineer: Ryan Decker
Stream Q7-10 (cfs): 4730

	Facility Flows				Stream Flows		
	Intake (Stream) (MGD)	Intake (External) (MGD)	Consumptive Loss (MGD)	Discharge Flow (MGD)	Upstream Stream Flow (cfs)	Adjusted Stream Flow (cfs)	Downstream Stream Flow (cfs)
Jan 1-31	18	0	14.25	3.75	15136.00	3021.63	3027.43
Feb 1-29	18	0	14.25	3.75	16555.00	3305.43	3311.23
Mar 1-31	18	0	14.25	3.75	33110.00	6616.43	6622.23
Apr 1-15	18	0	14.25	3.75	43989.00	8792.23	8798.03
Apr 16-30	18	0	14.25	3.75	43989.00	8792.23	8798.03
May 1-15	18	0	14.25	3.75	24123.00	4819.03	4824.83
May 16-30	18	0	14.25	3.75	24123.00	4819.03	4824.83
Jun 1-15	18	0	14.25	3.75	14190.00	2832.43	2838.23
Jun 16-30	18	0	14.25	3.75	14190.00	2832.43	2838.23
Jul 1-31	18	0	14.25	3.75	8041.00	1602.63	1608.43
Aug 1-15	18	0	14.25	3.75	6622.00	1318.83	1324.63
Aug 16-31	18	0	14.25	3.75	6622.00	1318.83	1324.63
Sep 1-15	18	0	14.25	3.75	5203.00	1035.03	1040.83
Sep 16-30	18	0	14.25	3.75	5203.00	1035.03	1040.83
Oct 1-15	18	0	14.25	3.75	5676.00	1129.63	1135.43
Oct 16-31	18	0	14.25	3.75	5676.00	1129.63	1135.43
Nov 1-15	18	0	14.25	3.75	7568.00	1508.03	1513.83
Nov 16-30	18	0	14.25	3.75	7568.00	1508.03	1513.83
Dec 1-31	18	0	14.25	3.75	11352.00	2264.83	2270.63

Version 2.0 -- 07/01/2005 Reference: Implementation Guidance for Temperature Criteria, DEP-ID: 391-2000-017
NOTE: The user can only edit fields that are blue.
NOTE: MGD x 1.547 = cfs.

Facility: **Shell Polymers Monaca Site**
Permit Number: PA0002208
Stream: Ohio River

	WWF Criteria (ºF)	**CWF Criteria** (ºF)	**TSF Criteria** (ºF)	**316 Criteria** (ºF)	**Q7-10 Multipliers** (Used in Analysis)	**Q7-10 Multipliers** (Default - Info Only)
Jan 1-31	40	38	40	0	3.2	3.2
Feb 1-29	40	38	40	0	3.5	3.5
Mar 1-31	46	42	46	0	7	7
Apr 1-15	52	48	52	0	9.3	9.3
Apr 16-30	58	52	58	0	9.3	9.3
May 1-15	64	54	64	0	5.1	5.1
May 16-30	**71.2***	58	68	0	5.1	5.1
Jun 1-15	**78.8***	60	70	0	3	3
Jun 16-30	84	64	72	0	3	3
Jul 1-31	87	66	74	0	1.7	1.7
Aug 1-15	87	66	80	0	1.4	1.4
Aug 16-31	87	66	87	0	1.4	1.4
Sep 1-15	84	64	84	0	1.1	1.1
Sep 16-30	78	60	78	0	1.1	1.1
Oct 1-15	72	54	72	0	1.2	1.2
Oct 16-31	66	50	66	0	1.2	1.2
Nov 1-15	58	46	58	0	1.6	1.6
Nov 16-30	50	42	50	0	1.6	1.6
Dec 1-31	42	40	42	0	2.4	2.4

Notes:
WWF = Warm water fishes
CWF = Cold water fishes
TSF = Trout stocking

*ORSANCO Criteria

Facility: **Shell Polymers Monaca Site**
Permit Number: PA0002208 **PMF**
Stream: Ohio River 0.20

	WWF Ambient Stream Temperature (ºF) (Default)	Ambient Stream Temperature (ºF) (Site-specific data)	Target Maximum Stream Temp.[1] (ºF)	**WWF** Daily WLA[2] (Million BTUs/day)	**WWF** Daily WLA[3] (ºF)	at Discharge Flow (MGD)
Jan 1-31	35	0	40	81,589	110.0	3.75
Feb 1-29	35	0	40	89,238	110.0	3.75
Mar 1-31	40	0	46	214,163	110.0	3.75
Apr 1-15	47	0	52	237,107	110.0	3.75
Apr 16-30	53	0	58	237,107	110.0	3.75
May 1-15	58	0	64	156,035	110.0	3.75
May 16-30	62	0	71.2	239,254	110.0	3.75
Jun 1-15	67	0	78.8	180,517	110.0	3.75
Jun 16-30	71	0	84	198,875	110.0	3.75
Jul 1-31	75	0	87	104,033	110.0	3.75
Aug 1-15	74	0	87	92,817	110.0	3.75
Aug 16-31	74	0	87	92,817	110.0	3.75
Sep 1-15	71	0	84	72,931	110.0	3.75
Sep 16-30	65	0	78	72,931	110.0	3.75
Oct 1-15	60	0	72	73,440	110.0	3.75
Oct 16-31	54	0	66	73,440	110.0	3.75
Nov 1-15	48	0	58	81,596	110.0	3.75
Nov 16-30	42	0	50	65,276	110.0	3.75
Dec 1-31	37	0	42	61,194	110.0	3.75

[1] This is the maximum of the WWF WQ criterion or the ambient temperature. The ambient temperature may be either the design (median) temperature for WWF, or the ambient stream temperature based on site-specific data entered by the user. A minimum of 1ºF above ambient stream temperature is allocated.

[2] The WLA expressed in Million BTUs/day is valid for Case 1 scenarios, and disabled for Case 2 scenarios.

[3] The WLA expressed in ºF is valid only if the limit is tied to a daily discharge flow limit (may be used for Case 1 or Case 2). WLAs greater than 110ºF are displayed as 110ºF.

ATTACHMENT E

TRC Modeling Results for Outfall 001

TRC EVALUATION

4730	**= Q stream (cfs)**	**0.5**	**= CV Daily**
3.75	**= Q discharge (MGD)**	**0.5**	**= CV Hourly**
4	**= no. samples**	**0.066**	**= AFC_Partial Mix Factor**
0.3	**= Chlorine Demand of Stream**	**0.2**	**= CFC_Partial Mix Factor**
0	**= Chlorine Demand of Discharge**	**15**	**= AFC_Criteria Compliance Time (min)**
0.5	**= BAT/BPJ Value**	**720**	**= CFC_Criteria Compliance Time (min)**
	= % Factor of Safety (FOS)		**=Decay Coefficient (K)**

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	**1.3.2.iii**	WLA afc = 17.185	**1.3.2.iii**	WLA cfc = 50.725
PENTOXSD TRG	**5.1a**	LTAMULT afc = 0.373	**5.1c**	LTAMULT cfc = 0.581
PENTOXSD TRG	**5.1b**	LTA_afc= 6.404	**5.1d**	LTA_cfc = 29.489

Source	Reference	Effluent Limit Calculations		
PENTOXSD TRG	**5.1f**	AML MULT =	1.720	
PENTOXSD TRG	**5.1g**	AVG MON LIMIT (mg/l) =	0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) =	1.170	

WLA afc	**(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc)) + Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	**(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc)) + Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))
AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)
INST MAX LIMIT	**1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)**